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EDITORIAL NOTES.

The Government and Coal Supplies.

IF ever there was a time when the Government should intervene, and effectively use their powers and resources, in the matter of the provision and distribution of coal to the industries and the community generally, that time is now. If we except the national coal strike in 1912, not for many long years has there been greater chaos in regard to coal than now; not for many long years has there been greater hardship. Nearly everybody who has anything to do with the handling of coal before it reaches the consumer appears to be doing his best to make as large a profit as possible either from it or from the means of its conveyance and distribution. Opportunism in this direction is now rampant; and it is the worst possible form of opportunism that can take advantage of a national crisis to compel the payment of extraordinary profits. The circumstances are fully ripe for the intervention of the Government; but although the importance of the matter has been pressed incessantly upon them, there has not yet been any pronounced evidence of a desire on their part to operate for a maximum of effectiveness in the direction of providing relief. On the contrary, through the charges made by the Government for the use of interned vessels, they are rendering excellent service to those shipowners who are lining their pockets to such an extent that the freightage on the tonnage dealt with will soon, in the aggregate, represent the capital values of their boats.

The London Gas and Electricity Companies and Authorities, and the Authorities responsible for public services in other parts of the country, with dwindling coal stocks and sluggish deliveries, recently considered the matter of such imposing importance that it ought to be brought directly to the notice of the Prime Minister; and an interview was sought with him. Mr. Asquith, busy with affairs of larger vital urgency, found it impossible to concede an interview, and referred the matter to his colleague, the President of the Board of Trade. The interview with Mr. Runciman took place on Wednesday last, as noted in another part of the "JOURNAL." Being private, we are unable to report the speeches that were made; but those who have followed up the matter from the various points of view, according to geological situation, can pretty well frame within their minds the lines that were taken by those who were the spokesmen. There is one thing that must have impressed Mr. Runciman; and it is that the representatives of vast public services and interests who were before him were genuinely concerned as to the jeopardy in which these services and interests stood without there was immediate relief—jeopardy not only now, but more so a few months hence when winter again approaches. Both gas and electricity are vitally necessary to the industries of the country, in some of which every nerve, every machine, and every hour are being strained to secure the maximum output of war material. The gas industry is also helping in the provision of raw materials for the production of explosives. The general community, too, are very dependent upon both the gas and electricity supply industries. Gas is almost universally employed for one or more purposes in most households, and largely among the poor. Therefore the question of coal supplies to the two great industries that joined forces before Mr. Runciman on Wednesday is a national one; and we should like to see the Government seriously recognize and treat it as such. Though there could hardly have been anything put before the President of the Board of Trade at the interview that he had not heard or known before, it is sincerely hoped that the presence of such a deputation will have good effect in bringing about reconsideration of the position, and prompt action.

Mr. Runciman, in fact, promised that the representations should have his best consideration; and he moreover intimated that he would be pleased to consider any further suggestions that might be submitted to him. We fail to see what other suggestions can be made. The whole situation is compressed within the limits of provision and distribution. Labour at the coal-pits is not at its normal power, owing to the number of men away with the country's forces. It is suggested that the Eight Hours Mines Regulation Act should be suspended. But there is no proof of any occasion for this. In Durham and Northumberland, owing to the loss of a considerable part of the export trade, there is said to be an abundant supply of coal. In other fields, if the miners would only work full time, and if there were a sufficiency of railway trucks, there would not, it is said, be any trouble in the matter of supply. That is one point. The other is distribution. It is manifest that a much larger reorganization than has yet taken place of the goods traffic on the railways is essential; and there the Government can also move. It is apparent that the information which the Board of Trade obtain as to the greater availability of trucks as well as the lessened delays on the railways does not wholly square with the facts. Complaint of protracted delays is as rife as ever in some quarters. Then there is the question of the charges for the interned steamers. The liberation of these for the work of coal transport has not been carried anything like far enough to make, through competition, any impression upon the freightage market; and the fixing of high maximum prices by the Government for the interned steamers is absolutely useless as a means for bringing freightage down to a reasonable level. It was stated in the House the other night by Mr. Runciman that the highest freight per ton of coal paid in the case of interned steamers is 13s., or 1s. 6d. to 2s. 6d. below the rates for outside steamers. The rate at the time he was speaking (last Thursday) on interned steamers was 12s.; and for outside steamers 14s. 6d. to 15s. 6d. These figures show as plainly as anything can do that the policy adopted by the Government is altogether ineffectual for the purpose of bringing the shipowners to a more rational frame of mind, and of deposing that unpatriotic mercenariness which unfortunately at the present time so largely prevails. National interests surely stand in the eyes of the Government before those of private individuals. We are sorry to say there is not found much evidence, in this particular relation—that of freightages for ships—that this is so. The many and the poor are being fleeced for the enrichment of the few. This is the plain truth of the matter. It is for the Government to decline to be participants in the movement, and to take steps to counteract it.

The London coal merchants have now also a complaint. The extortionate prices that have been charged in and about London for coal, particularly by the street retailers of small quantities in the areas where the greatest poverty reigns, are, as is known, the subject of an inquiry by a Committee appointed by the Government. Naturally, the coal retailers say they are spotless, and are not to blame. We are not prepared to defend their innocence in the matter. Now comes a cry from the coal merchants for the intervention of the Government in order to prevent the colliery owners making an undue increase in coal prices for contracts for the ensuing twelve months. As was mentioned last week, colliery costs are up from about 1s. 6d. to 2s. per ton; and there was also reference to what is happening in connection with early settlements of gas coal contracts. In regard to household coal, one firm of merchants writes: "For "some time rumours have been current that collieries intend "to ask a minimum of 5s. per ton advance for all contracts "to be renewed this year. As all contract prices were at "the height of a three-years boom last year, anything of "this nature would be a deliberate attempt to exploit the "rest of the community, and it is up to the Government to "take steps to avoid any such calamity now, as the majority "of contracts come up for renewal between now and the "end of June." Already a price 6s. to 7s. per ton additional has been asked for household coal contracts compared with this time last year. If the Government are minded to do anything in this direction, the sooner they move the better. But there is not much ground for hope in the matter.

Gas Referees and the Standard Calorific Test.

THERE has been some little inconvenience caused not only in London, but wherever gas undertakings exist that were brought under the calorific standard last session, owing to the delay in the issue this year of the "Notification" of the Metropolitan Gas Referees. The change that was necessitated in the calorimeter and conditions of calorific power testing through the prescription of "total heat value" in the Act of the Gas Light and Coke Company is responsible for the delay, as investigations of, and structural alterations in, the standard form of instrument were necessitated. But now with the issue of the "Notification," progress can be made with the work of station equipment. It seems that the calorific value testings of the gas supplied by the South Metropolitan Gas Company and by the Commercial Company, which Companies are not under a calorific standard (testings being made in their case for "information only"), will be in conformity with those to which the Gas Light and Coke Company are entitled by their Act of last session. When (we take it this will happen some day) the standards of the South Metropolitan and Commercial Companies are transferred to calorific power, there will be no necessity for the Referees to continue their prescriptions for the testing of illuminating power; and then those suburban and provincial undertakings which remain under the illuminating power standard will only have for guidance what has existed in this particular. This reminds that of late years the Gas Referees have grown to be something more to the gas industry than a purely Metropolitan body, through the general adoption of the apparatus and testing conditions specified by them in the annual "Notification." What has occurred in connection with the illuminating power standard will doubtless be repeated in relation to the calorific value standard; and therefore, for the information of all and sundry who are technically interested, we have reproduced *in extenso* the part of the new "Notification" referring to the calorific power tests. It is the duty of the Referees not only to prescribe the conditions, but the apparatus to be used. There may be an opening for dispute here. Although it is the duty of the Referees to prescribe the apparatus, the provision of the Gaslight Act imposing the duty is also mandatory in another respect. It provides that the apparatus "shall be the most suitable for ascertaining, and in making "the test shall be used in such a manner, and under such "conditions, as to ascertain, after any necessary calcula-"tions have been made, the total heat value of the gas." As yet, there is little general experience with the Boys calorimeter as altered, or any other one specially designed for the purpose of giving gas credit for its maximum heat value. After the Boys instrument has been for a time in the hands of independent observers, and tested against other rivals, then there will be either confirmation of the Referees' prescription, or a contention that it is not the instrument that is the "most suitable" for ascertaining the total heat value of the gas. Judgment on this point must wait on experience; but there can be no doubt as to the satisfaction of the Referees on the point.

A Bolometric Method for the Measurement of Radiant Heat.

THERE is little doubt that the fate of the water-tube radiometer is sealed so far as standard testings for gas-fires are concerned. Either the old radiometer will be displaced by a new one in the Leeds method or an entirely new method will be adopted. Some time since, it came to our knowledge and that of our readers that Dr. W. A. Bone, F.R.S., Professor H. L. Callendar, F.R.S., and Mr. H. James Yates were collaborating in investigation with a view to perfecting an entirely new bolometric method expressly for the purpose of measuring gas-fire radiation, in order to avoid the acknowledged deficiencies of the Leeds method. A paper prepared by the joint workers, and read by Dr. Bone before the Royal Society last Thursday, announces in effect that the authors are so satisfied with their success, that they propose that the new method should be substituted for the Leeds one. At the moment, owing to the restrictions of the Royal Society as to prior publication, we can only give our readers the merest indication of the contents of the paper, but hope the full text will be available shortly. The investigation has been long, and full of detail; but the collaborators believe that, in the result, their specially designed instrument is a very fine one. It is small in size, and weighs only about 2 lbs. It is seen, too, from the abstract of the paper elsewhere that the authors testify to it being both rapid and very accurate in working. It is so constructed that what may be termed the "personal factor" in a test is practically eliminated. Furthermore, the receiving surface of the instrument is sufficiently small to allow of its being standardized from an absolute source of radiation, such as a radio-balance; and therefore the results obtained by it are claimed by the authors to have an absolute value. We know that a great deal of time has been expended upon this problem by Dr. Bone and Professor Callendar. The latter is the acknowledged highest authority in Great Britain on the measurement of radiation, and combining Dr. Bone's experience of the special problem of the gas-fire, there ought to be in this co-partnership a complete guarantee as to the soundness and accuracy of the new instrument. We are certain, too, Dr. Bone and Professor Callendar would desire that acknowledgment should be made of the effective collaboration with them of Mr. Yates and his staff. Without their help, it would (we believe we are not exceeding the bounds of truth in saying) have been impossible for the two scientists to have pushed forward the work so rapidly as they have done; while the criticism, sought and given, of their basic ideas has no doubt been of great value in evolving the final form of the instrument.

The Field for Constant Control and Fresh Work in Carbonization.

THE mistaken notion is held in some quarters that carbonization plant has reached such a high level of standardization, both in regard to structure and methods of working, that it does not require constant surveillance. The best of plants, if there is to be regularity in high result, must be under absolute control, or there is bound sooner or later to be considerable loss through indifferent working results, which are not by any means summed up by the make of gas per ton. Without control, the high make may contain an excessive amount of incombustibles, the calorific power may run down, from normal ammonia result there may be loss, and the fuel account may be a wasteful one. In other ways, too, the carbonizing work may vary between "good" and "very indifferent," unless there be given to it the control of scientific process. The point forces itself upon attention, in reading the Presidential Address [published last week] of Mr. John W. Lee, the Chief Chemist of the Grassmoor Colliery Company, to the Yorkshire Junior Association, and the paper by Mr. David Fulton, of Helensburgh, to the Scottish Junior Association (Western Division), as printed this week. Mr. Lee, like the President of the North of England Gas Managers' Association in 1913 (Mr. E. F. Hooper, F.C.S.), is associated with the bye-product coking industry. It is a pleasure to see this conjunction of the technical men of the two coal-carbonizing industries, as there is a good deal for the gas manufacturer to learn from those technically identified with bye-product coke-ovens, and we hope that it may be said the condition is reciprocal. The secret of the rapid success of bye-product coking has no doubt been largely due to (as Professor Cobb said at the Yorkshire Junior meeting) the thorough manner in which, on the one hand, the details of plant have been worked out, and, on the other, to the effective permanent control accorded to the plant by the employment of competent men in the laboratories. Mr. Lee showed, by the results embodied in his address, the advantages realized by this control; and Mr. Fulton in his paper illustrates with equal emphasis how necessary control is in connection with such a plant as that of the Glover-West type, upon every detail of which much thought has been expended. The economy and profit derivable from scientific control in carbonization work is inestimable. Just one illustration from Mr. Lee's address. He points to a saving of many thousands of pounds a year by using three "CO_2 Recorders" on the Otto coke-oven plant with which he is identified. These recorders are money-savers on the high-scale.

Though this is the position of things, Professor Cobb, on the occasion of Mr. Lee's address, urged young men qualifying for positions in connection with the chemical department attached to coal carbonizing plants not to imagine that there is no scope left for any ingenuity, and that, with the processes of control already devised, there is no outlook for the chemist beyond that of pursuing a daily round of functions which would grow very monotonous. Although the coke-oven bye-product systems, and vertical and hori-

zontal retort systems in gas-works, have been raised to a high state of perfection, no one is going to say that ultimate perfection has been achieved. Very far from it. There are still many unsolved problems in connection with coal carbonizing; there are still fairly considerable losses of valuable constituents of the coal. In all these things, in addition to the daily duties of control, there is much scope for the ingenious and the inventive chemist. For example, from the point of view of ammonia efficiency in relation to the nitrogen content of the coal, neither the coke-oven nor the gas-retort, although the former does better than the latter, is all that could be desired. As Mr. F. D. Marshall pointed out in his Manchester University Lecture in 1911, analyses show that a considerable percentage of the nitrogen of the coal remains in the coke and breeze. The recovery of a large part of this in the form of ammonia—not only from the coke for sale, but from the coke used as fuel—offers a good field for investigation. Professor Cobb has evidently got his eye on this as a line for research; and manifestly his ideas are running towards the liberation of ammonia from coke by the application of steam. It is due to steam that the Mond producer has such a remarkably high ammonia efficiency. This, however, is only an instance of the problems and work that await the research chemist. Even in the matter of the extension and improvement of methods of control, there is scope for ingenuity. An ultimate perfection in these methods has by no means been reached. One desideratum that may be mentioned is simplification so as to escape tedious and time-absorbing tests. In connection with coke-oven working, Mr. Lee supplies an example. A quick and accurate process is wanted for the measuring of the small quantities of benzol left in gas after washing for its extraction. The method at present employed is too slow; and the results are very unreliable. There is the gravitometer, designed for this purpose by Messrs. Alexander Wright and Co.; the principle upon which it is based being the recording of the difference in gravity between stripped and unstripped gas. We do not recollect seeing, and apparently Mr. Lee has not seen, any substantiation from daily working that this instrument will give a constant record. If it does, it should be a valuable adjunct to any bye-product plant.

In Mr. Fulton's paper on the Glover-West verticals at Helensburgh, it is, all the way through, seen how necessary it is to have constant control with even a modern plant of this kind. But this is not peculiar to the Glover-West settings. If one deliberately picked from the paper all the points to which the author directed attention as requiring regular supervision, a stranger might, without consideration, be inclined to think that this is rather a troublesome form of plant. It is just the reverse. The control that should be given to these retorts is for the purpose of obtaining maximum efficiency under the circumstances of use. Such control is required by other systems, and ought to have been consistently conferred upon the predecessors of the vertical systems. There was much neglect of this matter once upon a time; but the neglect is now disappearing in the desire and search for higher working efficiencies. Even in comparatively small works fairly constant laboratory supervision would pay for itself over and over again. This has been demonstrated in several places where laboratory control has been adopted, through the general raising of works' efficiency, and the larger control obtained over the purchase and sale of materials. Such results from such control find expression in the accounts.

The paper by Mr. Fulton presents a number of controversial points, some of which other workers with vertical retorts will be prepared to contest, or to treat to a little qualification. He contends that with vertical retorts it is impossible to get as high candle power for an equivalent make of gas as from the horizontal system, using the same coal. This is a point that claims some modification; but it is certain that Mr. W. Blair is quite contented with the installation he was instrumental in having made at Helensburgh; for, notwithstanding the excess capital expenditure over a horizontal plant, the increased make, and the savings in various directions, together with the lower cost of renewals and repairs, supply, as seen towards the end of the paper, full justification for the adoption of the system in works of the size of those at Helensburgh. But several of these savings Mr. Fulton proposes to annihilate by means of a suggestion which he offers with a view to obtaining a higher illuminating power gas. His idea is that, if vertical retorts of less length were used, the heats could be so adjusted that gas would be driven off more quickly, and the hydrocarbons, having a shorter travel through incandescent coke, would not be cracked-up to the same extent. What would happen? More ground space would be required the capital cost would be larger, the fuel account would be heavier, and so would be all the attendant charges. This is indeed a case in which it may be asked whether "the game "would be worth the candle."

Ammonium Chloride and Dry Mains.

A HIGHLY useful paper was read last Saturday, at the meeting of the Manchester Junior Institution, by Mr. William Buckley, of the Rochdale Road Gas-Works, Manchester. Deposits in works' mains are so common that one is sometimes prone to accept their occurrence as almost unavoidable. They are unpleasant effects of certain causes, upon which causes comparatively little investigation has been expended, or, if there has been more than we suspect, then there has been very little said about it. Mr. Buckley, not without good ground, blames the use of dry retort-bench mains for much of the trouble. A concomitant of the use of dry mains is ammonium chloride; and ammonium chloride is found to be present to greater or less degree in all the deposits experienced in retort-houses. The point is of great importance to the users of vertical retort systems working with dry mains. At the Droylsden works at Manchester, there was considerable difficulty from pitching-up in the vertical installation; and what was experienced there would no doubt account for the troubles elsewhere arising from deposits in connection with both vertical and horizontal retorts worked with dry mains. The remedy Mr. Buckley says he has found to be efficacious has been the adoption of "dry" mains, in which the hydraulic or collecting main always contains liquor; the dip-pipes only being sealed during the period occupied by the drawing and charging of the retorts. Mains of this type have been in excellent condition after long periods of working. Where dry mains are used, the ammonium chloride deposited acts as a binding agent on the tar; whereas where there is liquor in the main, the ammonium chloride is kept in solution, and, crystals not being deposited, the tar is free to run away. The evidence appears to be very complete in the paper that Mr. Buckley has touched the root of the cause and its simple cure.

The Treasury and Capital Raising.

Few Select Committees will be wanted this session to dispose of the Private Bill business; and the demands upon the time of the few will not be great. One Committee of the House of Commons began their sittings last Thursday with a Gas Bill. A week after this opening was made—that is, the day after to-morrow—both Houses will, it is expected, adjourn until April 13; and not until after that date will the Upper House trouble its noble brains over Private Bill promotions. In connection with the very first Bill that was taken last Thursday—the Skegness Gas Purchase Bill—it was announced that the Treasury had determined, in the matter of the prudent decision arrived at in January, to prohibit the raising of fresh capital without the consent of the Treasury, to descend to a ridiculous measure through Private Bill and Provisional Order promotions. It is proposed that in every Bill or Order, a clause fashioned in this wise shall be inserted: "Notwithstanding anything in this Act, the Company [or Council] shall not, under the powers of this Act raise or borrow any money during the continuance of the present war and twelve months thereafter, unless the consent of the Treasury has been previously obtained." The Speaker's Counsel (Mr. Ernest Moon, K.C.) is not altogether enamoured of the wording of the clause, as, in his opinion, it is somewhat vague. We are not enamoured of it, because it is so absolutely useless. But no great objection can be taken to it, seeing it is as harmless as it is unnecessary. What good the Treasury think is going to be effected by putting the clause in a few isolated Bills and Orders is something it would be interesting to have explained. In the case of Gas Bills and Orders, for example, probably the whole number of promotions this session does not represent more than about 2 per cent. of the total gas undertakings in the United Kingdom. What of the other ninety and eight? They are covered (without a special clause) just as are the promoting concerns in Parliament this year by the regulations promulgated in January, which compel all persons or undertakings before making fresh

issues of capital to obtain the approval of the Treasury. However, if the new clause gives the Treasury any pleasure, no further objection need be raised to it. It may perhaps serve one useful purpose, and that is as a reminder to those who in time far ahead have to refer to the Acts and Orders of the years of the great European war, which was marked by the vilest of inhumanity on the part of the enemies of the Allies. With the Treasury regulations in force, we see no other useful object for the special clause.

Loan Restrictions.

Several references have also been made the last few days, both in the course of Local Government Board inquiries and at Council meetings, to the curtailment of expenditure, in consequence of the money being now more urgently required for other purposes. It will be seen, on turning to the notes in this issue on the "Gas Industry and the War," that in one case the Local Government Board inspector gave no encouragement whatever to an application for a fairly big loan for gas-works extension purposes; while subsequently, at another inquiry, he declared that the Local Government Board, in conjunction with the Treasury, had decided not to allow any expenditure during the war, unless it was needed to enable work to be done to carry out Government contracts—expenditure for ordinary developments must be suspended, as borrowing powers would not be granted for them. This state of affairs will have a noticeable effect when later on the time comes to compare subsequent financial statements relating to the receipts, expenditure, and outstanding loans of the principal classes of local authorities with that just issued, which is for the year ended March, 1914. This particular statement is a brief summary of the financial transactions of the authorities, so as to render the main figures available for reference without waiting for the details which appear in the Local Taxation Return volumes, when published. The present statement contains the following figures: Receipts, all sources except loans, £137,030,000; expenditure, except that charged on loans, £136,192,000; receipts from loans, £18,092,000; expenditure charged on loans, £18,428,000; outstanding loan debt at the end of the year, £429,580,000; and sums standing to the credit of sinking funds and similar funds, towards the repayment of the portion of the outstanding loans so repayable, £35,084,000. The item of expenditure includes £1,026,000 paid during the year out of depreciation, reserve, and insurance funds, in respect of electricity and gas supply undertakings, water-works, tramways, light railways, harbours, &c., but excludes £1,020,000 paid during the year into these funds. The profits of these reproductive undertakings transferred in aid of public rates totalled £1,633,000; and the sums transferred to meet deficiencies came to £1,150,000. For the preceding twelve months, the respective figures were £1,646,000 and £980,000.

Benzol and Toluene from Crude Petroleum.

The daily papers occasionally publish some startling intelligence on technical matters—sometimes it is highly amusing to the technically informed, but misleading to the general public whose knowledge of the subject is unequal to the task of determining whether or not there is anything in the news. Just recently, Professor Gregory, the Assistant Editor of "Nature," suggested that it would be an excellent thing if the daily papers had a qualified expert to edit before publication information of a technical nature. But the trouble is they would want so many technical experts, as competence on all subjects could not be found in any one man. The "Daily Telegraph" came out last week with a communication from their New York correspondent, which was headed "Notable Discoveries by an American Chemist—Explosives and Dyestuffs." The statement that followed was to the effect that Dr. Rittman, the Chemical Engineer to the Bureau of Mines, of Washington, has made important discoveries which "may" render the United States independent of Germany for supplies of the materials that are needed for the production of dyestuffs and high explosives. One would have thought that America would have rendered herself independent of Germany for such raw material before this; for America has plenty of tar-distillation plants at work. It goes on to state that the discovery (which has caused great elation among ordinance experts) consists principally in obtaining the benzol and toluol from crude petroleum. Twenty years ago Redwood and Holloway referred to benzene having been found by quite a number of experimenters in various crude petroleums; and they added that "toluene appears also to be invariably present." Some of the names mentioned by them carry us back more than twenty years. Professor Lewes, too, mentioned in one of his lectures on "Petrol Substitutes" that benzol was first discovered by Faraday when investigating the liquid hydrocarbons produced by oil gas. More information will be required before being able to speak positively as to whether "discovery" is the right word to apply to whatever Dr. Rittman has done. And some particulars as to quantities and qualities will also be of interest. We have no fear for the position of coal tar in consequence of anything that gentleman may have "discovered" in crude petroleum.

Domestic Uses of Coke.

Although coke yards are now well cleared out, there has been no lack of material in our columns, composed of sound advice and hints based on experience, having for its object the stimulating of work, with the view to creating permanent demand. In the time succeeding the war, we shall have, in the condition of coke-storage grounds, the index to the degree to which the managements have availed themselves of present opportunities, and to the measure of success that has attended their efforts in opening-up new demand. There is, in connection with the sale of coke for domestic purposes, some surprise in finding upon investigation how many gas undertakings there are that do not make to local retailers of fuel a special encouraging reduction from yard prices. Those gas-works that offer a reduction which makes it worth while for local traders to try to cultivate business in this direction, find that it pays. Permanent advantage should not take a secondary place to present disposal. Passing from that, a good testimonial to coke as a domestic fuel appeared in an article by Professor James Long in the "Evening News" yesterday week. He advocated the reduction of the household coal bill by the use of broken coke, mixed with the coal—pointing out that coke gives off great heat, and, when combined with coal in equal proportions, makes an economical fire. In the course of the article, a homely illustration is supplied. The writer says: "My study fire has been burning one box of coal in the day, the weight of which was 15½ lb. An equal volume of coke, broken small, weighed exactly 12 lb. When the box was filled with a mixture of both, in equal proportions, it lasted equally long, so that there was a double saving effected, This is due to the smaller weight of fuel burnt and to the reduced cost of the mixture. The cost of the coal was 34s. a ton, while the cost of the mixture was reduced to 28s."

Nitrogen Products and Carbide Company.

On various occasions we have commented upon the mess into which those responsible for this Company have run the confiding shareholders. Apart from the very inflated claims, and the considerable financial responsibility attaching to the Company, an important question is, where have the Company gone technically wrong? In one respect, perhaps explanation is not difficult. To the best of our belief and knowledge Ostwald's process, which is one of the principal components in the operations of the Company, is a good one. With the development of the process, we remember, Mr. F. D. Marshall was associated; but this connection was severed on the promotion of Nitrogen Products and Carbide, Limited. Where in respect of the Ostwald process technical failure has probably arisen is in the use of cyanamide as the source of ammonia; and to cyanamide the Company are heavily committed. But if cyanamide is not the best source of ammonia, the value of the Norwegian water power must be considerably discounted—water power which was recently put forward as being of greater vital importance to the Company than was the life of patents. From the beginning of the present Company, we know, Mr. Marshall has disagreed with the use of cyanamide as the source of ammonia. In his opinion, it was too expensive; and gases—probably acetylene and phosphoric acid gases—would be given off, and upset the catalyzers. This did not happen while Mr. Marshall was in charge of the Vilvorde works; but after he left (owing principally to his objection to the cyanamide basis) others commenced to mix the cyanamide with certain salts in order to expedite the evolution of ammonia. If there has been trouble, here in all likelihood is the reason. At Gerthe, ammonia from gas liquor was used; and with all their love for water power and cyanamide, the Directors might be well advised to return to gas liquor.

The Management Question Again.

Just at the present moment, in view of the attention that has lately been drawn, through a particularly regrettable case, to an unfortunate aspect of municipal gas-works management, it may not be out of place to refer to another incident which, though unimportant in itself, has something of a bearing on the subject. The country is passing through a troublous period; but the members of the gas and other committees of the Pontypridd Urban District Council evidently find, in spite of this, more than sufficient opportunity to attend adequately to the public work they have undertaken. At least, this a fair inference to draw from the fact that there appeared in a recent issue of a local paper a report of a debate [of a character described as "acrimonious"], extending to two-and-a-half columns, arising out of the business of the Gas Committee. There is, it would appear, in process of erection a vertical retort installation; and in the course of the debate alluded to the Chairman of the Gas Committee stated that, as the result of personal inspection, he had formed the opinion that, in the early stages of the work, certain "material was employed which was not proper material." He added that the Clerk was a witness that "a portion of the stuff was put in in defiance of him, and a portion of the dirt was carted and tipped outside by their own cart." Subsequently it was explained by the Manager that certain material at the commencement of the contract was rejected by him [the rejection taking place before the Chairman's visit]; and to prevent any possibility of mistake, he had this material removed, in their own carts, and by their own men. The Chairman's argument, throughout the discussion, was that a clerk of works should be appointed; and a resolution to this effect was proposed. It was, however, negatived; and an amendment was carried, to the effect that the Gas Manager be empowered to obtain whatever assistance he might consider necessary to superintend the work. There is, of course, no objection whatever to this. The Manager ought to have all the assistance he "considers necessary to superintend the work;" and it may be doubted whether he will "consider" that such "assistance" is adequately represented by the inspections of the Chairman of the Gas Committee and the Clerk of the Council—particularly if their visits to the works are to be followed by "acrimonious debates," such as the one now referred to. The duty of the manager of a works is to manage; and it is difficult to understand how he can retain the requisite authority to enable him to do this in the most efficient manner possible if occurrences at the works are to be the subject of "acrimonious debates" [fully reported in the eagerly-devoured pages of the local press] among the members of his committee.

PERSONAL.

Mr. W. A. DAVIES, of Birkenhead, has been appointed Borough Treasurer of Preston, in succession to the late Mr. Carter.

Mr. WATSON SMITH was recently entertained at dinner by members of the Council and Publication Committee of the Society of Chemical Industry. Opportunity was taken to present to him, as a *souvenir* of his thirty-three years' services as Editor of the Society's "Journal," an album containing a short address signed by the President and all available Past-Presidents, members of the Council and Publication Committee, and the abstractors. The presentation was made by Sir William Crookes.

Mr. R. V. VASSAR-SMITH, the Chairman of the Gloucester Gas Company, was unable to preside at the recent half-yearly meeting on account of having to fulfil an engagement at the Treasury; and the following resolution was unanimously passed: "That the proprietors of the Gloucester Gaslight Company, in half-yearly meeting assembled, respectfully beg to express their recognition of the important national services rendered by their Chairman, Mr. R. Vassar Vassar-Smith, in reference to the war, as Chairman of Lloyds Bank, Limited; and they sincerely wish him continuance of health and strength in carrying out the duties of his eminent position in the financial world." The members of the Midland Association who visited Gloucester on the occasion of the spring meeting two years ago will have keen recollections of the hospitality extended to them by Mr. Vassar-Smith and his colleagues on the Board of the Gas Company.

The "Co-Partnership Journal" of the South Metropolitan Gas Company for the current month contains some interesting particulars by the Editor as to the life-work of Mr. JOHN ROBERT DURANT, who was for forty years in the Company's service as a bargeman. Two portraits are given—one of Mr. Durant and his wife (who died many years ago), and the other of himself in his garden. He was engaged just before Christmas, 1842, by Mr. Thomas Livesey, the then Secretary and Manager of the Company, whose two sons, George and Frank, were strongly attached to him. He retired on a pension in March, 1883, and has since lived in a cottage at Weybridge, where on the 2nd ult. he kept in a quiet way the hundredth anniversary of his birthday, cheered by many congratulatory messages—one being by telegram from the Private Secretary to His Majesty the King, another from Captain Holmes, R.F.A., late Commandant of the Weymouth Company of the National Reserve, in which Mr. Durant is enrolled as a "private," and others from many neighbours. The good wishes of the Directors, together with a present of tobacco from the Chairman, had been conveyed to him on the previous day. "Life for a hundred years," says "W.T.L.," in closing his interesting story, "falls to the lot of very few, and those few have to experience the loneliness caused by the passing away of all the associates of youth and early manhood. In this loneliness, and in the feebleness and infirmity of a great age, John Durant is sustained by the knowledge that for many years he worked diligently and conscientiously at the duties to which he was called."

OBITUARY.

Last Tuesday, Mr. HENRY ROFE, M.Inst.C.E., senior partner in the firm of H. Rofe and Son, Consulting Engineers, of Westminster, died in his seventy-seventh year. The name of deceased has appeared from time to time in the "JOURNAL" in connection with water and other schemes.

The death occurred last Thursday, at his residence at Chislehurst, of Mr. WILLIAM WILLETT, head of the firm of builders bearing his name, but more widely known in connection with his daylight-saving scheme, for which he endeavoured unsuccessfully to obtain legislative sanction. He was in his fifty-ninth year.

According to a telegram sent from Amsterdam on Saturday through Reuter's Agency, Herr MAX MANNESMANN, the inventor of the tubes bearing his name, died last Tuesday. Deceased and two of his brothers were interested in the Carl and Reynhard process, and established works at Swansea and elsewhere; but for many years past that Company has had no connection with the working of the patents in this country—their interests having been bought about fifteen or twenty years ago by the British Mannesmann Company, who have carried on the Swansea works ever since.

The members of the gas profession in America have just lost one of their oldest colleagues, Mr. ISAAC BATTIN, who died on the 12th ult., at West House, Swarthmore (Penn.), in his eighty-fourth year. Deceased was one of the pioneers of the gas industry, having been associated at first with his uncle, Mr. Joseph Battin, and employed in his early days at the plants in Elizabeth (N.J.), Yonkers (N.Y.), and Middletown (Conn.). In 1861 he became Superintendent of the Albany (N.Y.) Gas Light Company, with whom he remained until 1887, when he entered the service of the United Gas Improvement Company as Superintendent and Treasurer of the Omaha Gas Company; and he was the first of their employees to be retired, about five years ago, under their pension system. He was the oldest surviving member of the American Gas Institute, having been one of the first to join the American Gas Light Association; and he was an honorary member of the Iowa District Gas Association. His attendance for more than half-a-century at the annual meetings brought him a wide acquaintance in the gas fraternity, a number of whom ascribe their success not only to his technical advice, but also to the influence of his exemplary life. He was a member of numerous Masonic bodies and other organizations. He is survived by his widow, three daughters, and five sons, two of whom are interested in the gas business—Mr. William I. Battin being the Engineer of the Indiana Lighting Company, and Mr. T. Wilson Battin, the Vice-President of the Civic Service Corporation of Philadelphia. The removal of Mr. Isaac Battin severs a practically lifelong association with the "JOURNAL;" for he was a critical reader from the day it first started. There are few remaining who have such a record.

Alarm for Preventing Asphyxiation.—An automatic alarm or contrivance for the prevention of asphyxiation by gas, either intentionally or accidentally, has been patented by Mr. Thomas J. Rogers, of 154, Nassau Street, New York. It relates more particularly to the class of fusible circuit-closers for controlling alarms or cut-offs. The primary object of the device is the provision of an automatic circuit-closer, wherein, when the gas-tap has been accidentally or intentionally left open in a room or other enclosure, an electric circuit will be closed for actuating an annunciator or alarm, whereby attention may be drawn to the fact, and life saved by the person thus notified. Another object of the machine is the provision of a circuit-closer in which a fusible element is arranged, and is adapted to close an electric circuit, when fused, for the positive sounding of an alarm, or operating a cut-off whereby an alarm may be sounded on the escape of gas within an enclosure, or the supply of such gas be automatically shut off to avoid the possibility of accidental asphyxiation or other injury to a person therefrom. The device can be readily located within a concealed point in a room or enclosure, so as to avoid tampering

COAL SUPPLIES TO GAS-WORKS AND ELECTRIC LIGHT STATIONS.

Deputation to the President of the Board of Trade.

THE serious position in which gas and electricity supply undertakings stand in relation to coal supplies has been brought directly to the notice of the President of the Board of Trade (Mr. Runciman) by a deputation which waited upon him last Wednesday.

The deputation consisted of representatives of the London Gas Companies, Scotch Gas Authorities, the Institution of Gas Engineers, the Gas Companies' Protection Association, the Associated Municipal Electrical Engineers (Greater London), and delegates from the Conference of Metropolitan Authorities owning electric supply undertakings. The deputation was introduced by Sir Fortescue Flannery, Bart., M.P., the President of the Gas Companies' Protection Association.

The members of the deputation were:

Sir Corbet Woodall, Governor of the Gas Light and Coke Company.
Mr. Charles Carpenter, D.Sc., Chairman of the South Metropolitan Gas Company.
Mr. W. G. Bradshaw, Chairman of the Commercial Gas Company.
Mr. D. Milne Watson, General Manager of the Gas Light and Coke Company.
Mr. Stanley H. Jones, Engineer and General Manager of the Commercial Gas Company.
Mr. Edward Allen, Institution of Gas Engineers.
Mr. W. E. Price, do.
Mr. Alex. Wilson, do.
Mr. W. T. Dunn, do.
Mr. H. E. Jones, Chairman Gas Companies' Protection
Mr. Fred. E. Cooper, Secretary do. [Association.
Mr. C. F. Botley, Hastings and St. Leonards Gas Company.
Mr. Wm. C. P. Tapper, Associated Municipal Electrical Engineers.
Mr. E. Calvert, do.
Mr. R. S. Downe, Brompton and Kensington Electricity Supply.
Mr. Frank Bailey, City of London Electric Light Company.
Mr. F. J. Walker, St. James's and Central Electric Supply Companies.

GLASGOW—
Bailie Irwin (Convener of the Gas Committee).
Bailie Drummond (Sub-Convener).
Mr. Alex. Wilson (Gas Engineer).

EDINBURGH AND LEITH—
Bailie Lindsay (Convener of the Gas Committee).
Mr. Alex. Masterton (Gas Engineer).

DUNDEE—
Bailie Barnes (Convener of the Gas Committee).
Mr. A. Yuill (Gas Engineer).

ABERDEEN—
Councillor Mackenzie (Convener, Gas Committee).
Mr. S. Milne (Gas Engineer).

In the absence of the President of the Institution of Gas Engineers (Mr. John Bond) through indisposition, Mr. Edward Allen, ex-President, kindly took his place.

The President of the Board of Trade was addressed by Sir Corbet Woodall, Mr. Carpenter, Mr. H. E. Jones, Mr. Edward Allen, Mr. Frank Bailey, and Bailie Irwin of Glasgow, who gave particulars of the present condition of coal supplies, and drew attention to the vital questions which were involved.

A parliamentary correspondent writes: "The object of the deputation was to impress on the President of the Board of Trade the serious position in which the customers of gas and electricity undertakings are likely to be placed owing to the difficulties of getting supplies of coal. The fact that so many large industries in which the Government themselves are interested rely on gas and electricity undertakings for their power supply was emphasized, and attention was also called to the desirability of the Government facilitating supplies of coal to gas-works by reason of the large quantity of chemical bye-products to which special attention has been directed since the beginning of the war in order to provide the Government with, at any rate, a certain quantity of the raw material required for explosive purposes. The Board of Trade were asked to do all in their power to release as many as possible of the coal-trucks which are being used exclusively for Government purposes, as this has been one of the most serious factors contributing to the delay in the deliveries. The practical stoppage of sea-borne coal was put forward as another argument why special facilities should be given to enable the railway companies to increase the number of trucks in use for coal-supply purposes. Stress was also laid on the difficulties of the large number of poor people who rely on gas for lighting and cooking. The deputation was mainly on the subject of the facilitation of supplies; but the question of price was, it is understood, also commented upon. In some cases a freightage of 14s. per ton over the coal contract price is being demanded and obtained for sea-borne coal, and some restriction upon the quantity of coal now being shipped from this country was hinted at. A great grievance is that many people who have ordered coal on contract since the war started cannot obtain deliveries, while it is a known fact that others who are willing to pay the present high market prices are able to get supplies."

Mr. Runciman, in his reply, said he appreciated the seriousness of the situation, and promised that everything that was possible would be done by the Government to overcome the difficulties which the deputation had brought to his notice. He also intimated that he would be prepared to receive any further suggestions that might be submitted.

In replying to our request for the names of the Scotch representatives, Mr. Alex. Wilson remarks: "I am sure we all sincerely hope some good will come of the conference, and especially that some means will be found to regulate the export trade which is hitting us very badly in Glasgow. Although the export figures are lower than usual, the percentage is higher, and is causing a decided shortage for local supplies in the Lanarkshire district. This shortage has, of course, put the big stick into the hands of the colliery owners; and they are taking full advantage of it, both in export and local prices."

It will be observed from the above that the representatives appointed at the Manchester Conference on the 5th ult. did not attend with the other deputation. This was due to insufficient notice being given, and to Council meetings being held in most towns last Wednesday. The President of the Board of Trade has, however, kindly consented to receive a deputation representing Municipal Corporations in his private room at the House of Commons to-morrow; and representatives from Birmingham, Bradford, Leicester, Manchester, Nottingham, and Salford will attend. Mr. C. T. Needham, M.P. for South-West Manchester, has been instrumental in securing this separate interview; and he will introduce the deputation to Mr. Runciman.

THE GAS INDUSTRY AND THE WAR.

The Imperial Chancellor of Germany has sent, through the Ministry of the Interior, an edict addressed to the Central Gas Publicity Bureau, for the information of all German undertakings. The edict, which was published *in extenso* in the "Journal für Gasbeleuchtung" of the 20th of February, runs as follows:

Occasional stoppages in the coal supply to gas-works are unavoidable. It is, however, a matter of pressing interest that the production of gas from coal on gas-works shall not be diminished, but shall continue on the scale required to meet regular needs in addition to the increase resulting at the present time from the scarcity of petroleum. Measures for reducing the output of gas must be regarded as not permissible, as is likewise the partial replacement of coal gas by water gas manufacture to a greater extent than occurred in ordinary working at the particular works at the same time last year. Should it prove to be necessary, a prohibition to this effect will be promulgated by the Government. The most extensive production of coal gas is required in particular on account of the importance of tar products for war purposes. Having regard to this, attention will be given by the Government to the supply of a sufficiency of coal to gas-works. You are requested to bring the foregoing to the notice of gas-works.

Sir Paul A. Makins, Bart., a Director of Messrs. Glover and Main, Limited, has received a Captain's Commission in His Majesty's Army, and is now on active service abroad.

Lieutenant D. Euan Macpherson, 3rd Battalion Gordon Highlanders (son of Mr. Donald Macpherson), who some time ago arrived in England from the front badly wounded, has, we are pleased to learn, been promoted to Captain.

Mr. C. V. Townsend, the Engineer and Manager of the Hereford Corporation Gas-Works, who enlisted in the Grenadier Guards at the beginning of the war, has been given a Commission in the Shropshire Light Infantry.

Among those with the forces in whom "JOURNAL" readers are particularly interested is the eldest son of Mr. William Woodward (Engineer to the late Bromley Gas Company), who is a Lieutenant in the Lancashire Fusiliers.

In the course of the proceedings last Tuesday, at the meeting of the Lea Bridge District Gas Company, it was stated that, to meet the difficulties of the men with regard to the rise in the price of food, the Directors had decided, for the duration of the war, or until such times as prices are reduced more nearly to normal, to give a bonus proportional to the necessities of each case; the bonus to be paid monthly, commencing at the end of February. A Committee was formed to take into full consideration the circumstances of each individual employee, and prepare a scheme of bonuses for the approval of the Directors; and to enable them to do this, printed forms for filling up were distributed among the

employees. Accompanying this form was a communication from Mr. F. W. Cross, the Engineer and General Manager, pointing out how much is already being done by the Company for their employees, and some of the difficulties that have to be faced. He remarked that on the call of war the Directors contributed the sum of £315 to the Prince of Wales's Fund. They also encouraged the Territorials and others to join the army, and, up to Dec. 31, paid the sum of £338 in allowances to wives and dependants of men on service; and they were still paying at the rate of £15 per week, or nearly £800 per annum. The employees had established a special relief fund for the immediate benefit of those who came home sick or wounded; and the Directors had agreed to double the workmen's contribution to this fund. Further, the Directors had established a pension scheme, which applied to all the workmen; and at the present time six elderly men who had served the Company well in the past were in receipt of pensions. Taking all the facts of the case into consideration, Mr. Cross said he thought the men would appreciate that the present was not a fitting time for an all-round increase in wages.

The attitude of the Treasury with regard to loans for local works was emphasized in the course of a Local Government Board inquiry into an application by the Goole Urban District Council for sanction to borrow £13,000 for the provision of an installation of vertical retorts on the intermittent system. Mr. H. R. Hooper was the Inspector; and he asked if there was any reason why they could not continue with the present plant, at any rate until after the war. These were difficult times; and the works seemed to be able, with a little outlay during the summer, to carry them over next winter, with retrenchments. The Gas Manager (Mr. J. Fazakerley) replied that they would still be running risks. The Inspector said that was so; but they were all running risks throughout the country. The point was that the Treasury were not prepared at the present time to sanction loans for any local works that were not absolutely necessary; and from inquiries he had been able to make, he did not feel he could conscientiously advise the Board that this application was absolutely necessary. There seemed to be no immediate occasion to spend the money; they might try to get through the period of the war. No doubt the plant was out of date; but he thought some effort should be made by the Council to keep going with it for the present.

The Manchester City Council have been informed that the approval of the Treasury should be obtained for the raising of fresh loans in any form by the Corporation, whatever the purpose. Objection would not, as a rule, be raised to the issue of fresh mortgages for the purpose of replacing or renewing mortgages; but the Treasury will not sanction raising fresh capital for the purpose of meeting new expenditure. Capital expenditure ought not to be undertaken except for work in progress, and even in this case it should, wherever possible, be postponed or spread over a longer period.

A somewhat similar announcement was subsequently made by Mr. Hooper, during an inquiry at Heywood, when he stated that the Local Government Board, in conjunction with the Treasury, had decided not to allow any expenditure during the war, unless it was needed to enable work to be done to carry out Government contracts. Expenditure for ordinary developments must be suspended, as borrowing powers would not be granted for this.

At a meeting of the Belfast Corporation, Mr. Doran called attention to the reduction in street illumination, and asked specially as to the non-lighting of lamps at tramway stopping-places. The scarcity of coal at the gas-works might, he said, have something to do with this state of things; but he thought that under proper management the streets would not have been left for four months virtually in total darkness. Alderman Craig denied that the Gas Committee were unable to supply gas for the street-lamps. It was a disadvantage to them, and a loss, to have the public-lamps extinguished, because they had to retain their men.

Some local authorities in the West of England still seem to find it difficult to take seriously the military orders with reference to the restriction of lighting. A new proclamation on the subject was issued a week or so ago by the General in Command of the defences of Devon, giving very precise directions as to what should be done to prevent anything like bright illumination of squares or bridges or other places in which lights are ordinarily concentrated. When the matter was mentioned at a meeting of the Ilfracombe District Council, one of the members made it the subject of a joke. It was left to the Lighting Committee to decide, after conference with Mr. James Armstrong (the Gas Manager), what action should be taken in the matter. A similar course was decided upon by the Sidmouth Council, who also appear to have thought the danger is exaggerated. Only time can prove whether or not the military authorities are too cautious; but Ilfracombe and other towns in Devon which take an optimistic view of the prospect are not alone in acting perhaps a little too literally on the motto of "business as usual."

Inquiries in the Cheshire district show that the military authorities have decided to place certain restrictions upon lighting in these towns. An order has been issued which states that this is only a measure of precaution against possible attacks by an enemy, and need cause no alarm among the people. A reduction of the lighting is ordered to be made in the county of Cheshire, including the boroughs, except the portion comprising the Mersey Coast Defence.

Several proposals for increasing the wages of Corporation employees (either for the duration of hostilities or to a minimum for all circumstances) were discussed at last Tuesday's meeting of the Birmingham City Council; but none found acceptance. They were all rejected in favour of an amendment instructing the General Purposes Committee (with the addition of three labour men) to go specially into the question of employees' wages as affected by the war.

There is not entire satisfaction on the part of every member of the Manchester City Council with regard to the manner in which the lighting regulations have been carried into effect; but if the points referred to at last Wednesday's meeting of the Council are all that can be urged in opposition, there does not seem to be any serious cause for complaint. One member urged that too much caution was being advised; and that in any case the darkening of the city should be carried out with uniformity, which it had not been. Another said he did not know who was responsible for the colouring of the lamps; but the condition of them was a "standing disgrace to the city." The work ought to have been done by men who knew how to put on paint. It was stated by the Lord Mayor that a letter had been received from the Painters' Union complaining that the work of colouring the street-lamps had been done by the lamplighters, and that the Council had not kept to their agreement that painting should be done by properly qualified tradesmen. Alderman Kay (the Chairman of the Gas Committee) said the matter was urgent. The work of colouring the lamps was done at the request of the Chief Constable; and it was necessary to employ material that could be readily removed. What had been put on could be wiped off with a cloth; and it was material which did not come within the rules of the Painters' Union. The work had been done by the lamplighters at very little cost; and, in his opinion, it was not work which called for the employment of painters.

Action of Certain Metals on Water.

The current number of the "Chemical News" contains the final portion of a long report by Dr. W. P. Jorissen, of the University of Leiden, "On the Action of Lead, Copper, Tin, Nickel, Zinc, and Aluminium on Water." The principal investigations on the domain of the corrosion of the metals named were summarized, and contemplated from the same theoretical points of view. The author came to the conclusion that it is not possible to predict whether a special kind of drinking water, brought into contact with lead or zinc, under certain circumstances, will only dissolve quantities of lead or zinc compounds below a certain limit. In each special case it will, he says, be necessary to make a special experiment in which the practical circumstances are imitated as much as possible. As regards tin, there seems to be little danger of considerable corrosion by drinking water. He considers that it will be of special importance to investigate whether a "protective layer" is generated during the corrosion of a metal, and what its composition is.

The "Electrician" Electrical Trades Directory.

We have received from the "Electrician" Printing and Publishing Company, Limited, Salisbury Court, E.C., a copy of the thirty-third annual edition of the above-named Directory, which is familiarly known as the "Big Blue Book." It was published at the end of February, and its contents (occupying upwards of 2200 pages) are corrected up to the latest possible moment. The salient features of telephone progress in the United Kingdom last year the development of the steam-turbine and the internal-combustion engine, the progress made in arc, metal-filament, drawn-wire, and half-watt lamps, &c., are set out; and a summary is given of parliamentary work in the past session, so far as legislation has affected the electrical industry. The law of electric lighting, &c., is fully dealt with; and a digest, specially prepared by Mr. A. C. Curtis-Hayward, B.A., A.I.E.E., solicitor, is given. The principal legal decisions in 1914 affecting the electrical industry are included. Full financial details in regard to electric joint-stock enterprise, and ample information relating to the financial side of every branch of the electrical industry, will be found, including a directory of directors of electrical companies, particulars of the capital authorized and issued, the last dividends paid, latest Stock Exchange quotations, lists of chief officials, &c., also the electrical and allied companies wound-up during 1914. The directory division contains the names and addresses of practically all persons engaged in the electrical profession and industry throughout the United Kingdom, with their telephone numbers and telegraphic addresses; and a separate list of the telegraphic addresses (alphabetically arranged) is likewise included. In the biographical division will be found interesting original sketches of the careers of the leaders of electrical engineering enterprise at home and abroad. There is also a complete obituary for the past year. A full list of the electricity supply undertakings of the United Kingdom is given in the form of a number of compact tables; and large tables are also devoted to Colonial and Foreign undertakings of the same character. The price of the book is 15s. net, exclusive of postage.

THE NEW "NOTIFICATION" OF THE METROPOLITAN GAS REFEREES.

The Regulations for Calorific Power Testing.

THE Metropolitan Gas Referees have now issued their "Notification" for the current year; and we have been favoured with an advance copy of it. As explained in the "JOURNAL" for the 5th of January, the document could not be sent out at the usual time, owing to the necessity of procuring and testing some new apparatus consequent upon the changes brought about by the provisions of the Gas Light and Coke Company's Act of last session in regard to calorific power. The former "Notification" therefore remained in force, with the exceptions specified. The following is a summary of the portions of the document in which little or no change has been made, with the section on the testing of gas for calorific power reproduced in full.

The "Notification" opens, as before, with an indication of the duties of the Referees, lists of testing-places, and directions as to the service-pipes leading thereto and the standard lamp to be used for testing gas for illuminating power. In the section on the times and mode of such testing, it is specified that "only such of the provisions as apply to testings with the flat-flame burner are applicable in the case of the Gas Light and Coke Company," in accordance with sections 8, 9, 10, and 12 of their Act of last session. In the directions for testing with the "Metropolitan" argand burner No. 2, the paragraph in the previous "Notification" specifying that "the gas supplied by the gas companies is required to have an illuminating power of 14 candles," in accordance with section 4 (2) of the London Gas Act, 1905, and section 38 of the Gas Light and Coke Company's Act, 1909, now reads: "The gas supplied by the South Metropolitan and by the Commercial Gas Companies is required to have an illuminating power of 14 candles," in accordance with the section of the London Gas Act cited above. The other directions stand as before. Those in regard to making tests with the flat-flame burner have been extended by the addition of the following paragraph:

> If, owing to the supply at the present time of illuminating gas containing a large proportion of enriched water gas, and consequently of greater density, the burner will not pass sufficient gas to give a light of 8 candles, the gas examiner is to take the rate of consumption which with the burner at the near end of the slide has failed to give equality, and from these data and the aerorthometer reading to calculate as usual the corresponding illuminating power, and to return the illuminating power of the gas as being below this figure.

The directions for testing for sulphuretted hydrogen and other sulphur compounds follow; and then the Referees give the following instructions as to the

MODE OF TESTING THE CALORIFIC POWER OF THE GAS.

In the testing-places for the Gas Light and Coke Company, "the standard calorific power of the gas supplied by the Company in any part of their area of supply shall be 540 British thermal units; provided that the Company shall not be liable to any penalty or proceedings for or in respect of any deficiency in the calorific power of the gas supplied by them except under and in accordance with the express provisions of this Act. One testing only for calorific power shall be made at each testing-place daily; but in the event of the calorific power being on any testing ascertained to be below the standard calorific power to an extent exceeding 7½ per centum, the gas examiner shall forthwith give notice thereof to the Company, and a second testing shall be made at an interval of not less than one hour from the time of making the first testing at that testing-place, and the average of the two testings shall be deemed to be the calorific power of the gas at such testing-place on that day." [The Gas Light and Coke Company's Act, 1914, sec. 4 (1).]

In the testing-places for the South Metropolitan Gas Company, and for the Commercial Gas Company, the testing of the calorific power of the gas shall be made on such days as the controlling authority shall direct. [London Gas Act, 1905, sec. 5 (5).]

The calorimeter to be used in testing the calorific power of the gas shall be one which has been examined and certified by the Gas Referees. [A description of the calorimeter is given in an appendix to the paper as issued.]

A unit of heat, termed a British thermal unit (B.Th.U.) is the amount of heat which will raise the temperature of 1 lb. of water one degree Fahrenheit. The metric unit of heat, termed a calorie, is the amount of heat which will raise the temperature of a kilogram of water one degree Centigrade.

"The expression 'British thermal units' means British thermal units gross per cubic foot of gas." [The Gas Light and Coke Company's Act, 1914, sec. 3.]

The heating or calorific power of any sample of gas is represented by the number of units of heat produced by the combustion of one cubic foot of such gas measured at 60° Fahr. and under a pressure of 30 inches of mercury.

When the products of combustion are cooled before they escape, the heat imparted includes that which is due to the condensation into water of some of the steam formed by combustion, and that which is due to the cooling of the water thus formed from its boiling-point to a lower temperature.

The maximum calorific power which gas can thus exert is determined directly by the calorimeter. This, subject to small corrections due to contraction in consequence of combustion and to atmospheric conditions, is a true measure of the total heat value of the gas, and is generally termed the gross calorific power of the gas. But in many cases in which gas is used as a heating agent the steam which is formed escapes into the air uncondensed, and thus the heat due to the condensation of the steam and the cooling of the water so formed is not utilized. The amount of heat thus lost can be estimated, and if it is subtracted from the total heat yielded by the combustion of gas in the calorimeter, another value is obtained which is termed the net calorific power of the gas. Since, however, when steam escapes uncondensed the uncondensable products of combustion also pass away at a high temperature, and since the loss of heat thus arising is commonly the greater of the two, the customary partial correction from gross to net has not much significance.

In order to test the gas for calorific power, the gas shall first pass through a meter and an efficient governor. This may be a balance governor, or a diaphragm governor of a pattern approved by the Gas Referees. The connections between the meter and the calorimeter shall be tested for soundness at least once a month, and also immediately after every testing of which the result is less than 500 B.Th.U. gross. For this purpose the gas shall be turned on and the tap on the calorimeter shall be closed. If, after the lapse of not less than two minutes, it is found that the meter hand is moving forward as much as one division in four minutes, the leak shall be located and made good, and the connections again tested for soundness. The gas shall be turned on and lighted, and the form of the two flames observed. If either is out of shape, this must be rectified by clearing the burner or by substituting another burner. The tap of the calorimeter shall then be so adjusted as to allow the meter hand to make one turn in from 60 to 75 seconds. The water shall be turned on so that when the regular flow through the calorimeter has been established a little may pass the overflow of the funnel and trickle over into the sink. Water must be poured in through one of the holes in the lid until it begins to run out at the condensation outlet. The calorimeter may then be placed upon its base. The measuring vessel carrying the change-over funnel* [shown in an appendix] should then be placed in position in the sink, so that the outlet water is led into the sink. The hot water outlet-tube of the calorimeter should be above, but should not touch, the change-over funnel.

After an interval of not less than 30 minutes, the gas examiner, after bringing the reading glasses into position on the thermometers used for measuring the temperature of the inlet and outlet water, shall then make the following observations: When the meter hand is at 75, he shall read the inlet temperature; when it reaches 100, he shall move the funnel so as to direct the outflow into the measuring vessel, and at the same time he shall start the stop-clock or a stop-watch. When the meter hand reaches 25, he shall make the first reading of the outlet temperature. He shall continue to read the outlet temperature at every quarter turn until fifteen readings have been taken. The meter hand will then be at 75. He shall also at every turn of the meter, except the last, make a reading of the inlet temperature when the meter hand is between 75 and 100. When the meter hand reaches 100 after the last outlet temperature has been read, the gas examiner shall shift the funnel so as to direct the outlet into the sink again, and at the same time stop the clock or watch. The barometer and the thermometers showing the temperatures of the effluent gas, of the gas in the meter, and of the hygrometer, shall then be read. If the time of four revolutions of the meter hand is less than four or more than five minutes, the rate shall be readjusted, and after an interval of fifteen minutes the test shall be re-started. The time of four revolutions of the meter hand shall be entered on the form in Appendix L. The mean of the four readings of the inlet temperature is to be subtracted from the mean of the fifteen readings of the outlet temperature, and the difference is to be multiplied by three times 3·968, and by the number of litres of water collected, and the product is to be divided by the tabular number. The result when corrected for contraction and for atmospheric conditions is the total heat value of the gas measured in British thermal units per cubic foot. To facilitate these operations, the logarithm of $3 \times 3{\cdot}968$ is printed on the form at the end of Appendix L; and the logarithms of the reciprocals of the tabular numbers are tabulated in Appendix G. This logarithm may be found, therefore, in the table directly from the meter thermometer and barometer readings; and the addition of this to the other logarithms will have the effect of dividing by the tabular number.

When gas is burned in a calorimeter, the escaping products of combustion may be either warmer or cooler than the gas and air entering the calorimeter, and they occupy a smaller volume and are saturated with water vapour. In consequence they may contain a small quantity of heat due to combustion, which must be added to the calorific value found as described above; or where the circulating water is sufficiently cool they may give up heat

* Alternatively the change-over funnel may be carried by an arm attached to the lid of the calorimeter.

not due to the combustion of the gas, which similarly must be subtracted from the calorific value. In order to make this correction, the temperature and humidity of the air near the calorimeter shall be determined by the use of the ventilated wet and dry bulb hygrometer described in Appendix L. This shall be placed near the calorimeter. Not less than ten minutes before the calorimeter readings are taken the ventilating gas-flame shall be lighted and adjusted so as to be about 1½ inches long.

The readings of the dry and wet bulbs shall be found in columns 1 and 2 of Glaisher's Hygrometrical Tables (pp. 1 to 28). On the same line in column 7, which is headed "Vapour in a Cubic Foot of Air," will be found the number of grains of water contained as steam in a cubic foot of the air entering the calorimeter. Call this *a*. The reading of the meter thermometer shall then be found in both columns 1 and 2, and the corresponding number of grains of water in a cubic foot of the gas will be found in column 7. Call this *b*. The temperature of the effluent gases shall then be found in columns 1 and 2, and the number of grains of water in a cubic foot of these gases will be found in column 7. Call this *c*. On page XIV. of the same tables the weight in grains of a cubic foot of saturated air at the temperature of the effluent gases shall also be found to the nearest unit. Call this *d*. Subtract the reading of the dry bulb thermometer from that of the thermometer giving the temperature of the effluent gases, and call the difference *e*. If the effluent gas is cooler than the air entering the calorimeter, this difference will be negative in sign.

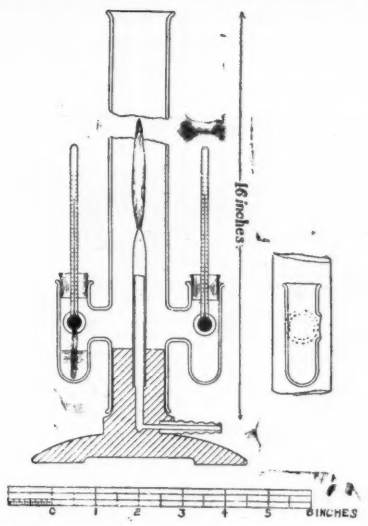
Find the value of $0{\cdot}15\,(6{\cdot}6\,c - 7\,a + b) + 0{\cdot}0022\,de$. The figure so obtained is the number of British thermal units to be added to the result obtained directly from the calorimeter in order to obtain the gross calorific power or total heat value of a cubic foot of gas. If $7\,a + b$ is greater than $6{\cdot}6\,c$ the first term in the expression above will be negative, and its numerical value will therefore have to be subtracted and not added; and similarly if the effluent gases are cooler than the air entering the instrument the second term will be negative, and its numerical value will in that case have to be subtracted and not added. An example of a complete determination is given in Appendix L. In this, letterpress and figures in the usual type represent a form in which the observations are conveniently set down and the calculations made; while the figures in blacker type are specimen figures of a sample observation and calculation of calorific power such as might be written by the gas examiner.

In addition to the observations described, the amount of condensed water resulting from the combustion of the gas shall be measured. For this purpose the condensation water shall be led into a flask not less than 15 minutes after the calorimeter has been placed in position, and the amount collected in not less than 20 minutes shall be measured, and entered with the time on the form. If the water collected shows a rate in excess of 150 c.c. per hour, the unions and coils of the calorimeter shall be examined for leakage. If this is found, the testing shall be discarded.

As the existing thermometers for reading the water temperatures are divided on the centigrade scale, and the water vessels for measuring the water passing through the calorimeter are divided in litres and decimals of a litre, the product of the observed rise of temperature and quantity of water gives the heat developed in an experiment in calories. As this figure must be multiplied by 3·968 to convert calories into British thermal units, the logarithm 1·0757 [in the form] includes this factor, as there explained.

Next come the directions for testing the pressure of gas and the meters to be used; and the "Notification," which is signed by the three Referees—Professor C. Vernon Boys, Dr. J. S. Haldane, and Mr. A. G. Vernon Harcourt—closes with the intimation that the regulations are to remain in force until they are superseded.

The "Notification" is followed by the usual appendices. Appendices A, B, and C relate to the 10-candle pentane lamp, the preparation of the pentane, and its provision in testing-places. Appendix D contains a description of the table photometer; Appendix E furnishes details of the "Metropolitan" No. 2 burner; and in Appendix F Mr. Vernon Harcourt's aerorthometer is shown. Appendix G consists entirely of tables—the first giving the tabular numbers to facilitate the correction of the volume of gas measured over water at various temperatures and under different atmospheric pressures; and the second (a new table) the logarithms of the reciprocals of the tabular numbers, being logarithms of aerorthometer readings. Appendices H and K deal with the tests for sulphuretted hydrogen and sulphur. In Appendix L is given a description of the gas calorimeter designed by Mr. Boys, which has been amplified by the addition of the following paragraph, relating to the ventilated wet and dry bulb hygrometer, already alluded to, which is shown in the diagram:



The following is the form for calculating the calorific value of gas to which reference has already been made:

> The main ventilating system consists of a single piece of glass of the shape and dimensions shown in the figure. This stands upon a metal base which, by means of a glass tube, carries a single rat-tail burner adapted to make a flame about an inch-and-a-half high The air to supply the burner and chimney is drawn in through the two holes opposite the thermometer bulbs, one of which is covered with cotton and connected by means of wick with the water in the cup immediately below. The glass tube fits easily over the stem of the metal base, which is covered with cloth or other soft material to prevent injury to the glass. The upper or chimney part of the glass tube may be made of metal fitting over a shorter glass tube; but the flame should in no case be obscured from view. The thermometers are divided into degrees on the Fahrenheit scale. Distilled water is to be used in the cup under the wet bulb.

Appendix M contains a description of the Referees' street-lamp pressure-gauge; and Appendix N, particulars of their 1-12th cubic foot measure designed by Mr. Harcourt. Appendix O gives an example of the form in which the returns are to be made; and the final appendix deals with the temporary loan by the Referees of pieces of apparatus to replace others requiring repair.

Calorific Value of Gas—Form, with Example of Calculation.

Water. Inlet.	Water. Outlet.
13·54° C.	32·72° C.
	·72
	·72
·55	·72
	·72
	·72
	·73
·57	·73
	·73
	·74
	·75
·58	·75
	·75
	·74
13·56	·74
Condensed water = 59 c.c. in 30 minutes, = 118 c.c. per hour.	15) ·48
	32·73
	13·56
Rise of temperature .	19·17° C.

Time of four revolutions of meter hand, **4** mins. **24** secs.
Barometer, **29·80** inches.
Water collected, **2·305** litres.

			Grains per Cubic Foot.		Grains.
Dry bulb .. 61° F. / Wet bulb .. 57° F.		a =	4·6	$7a$ =	32 2
		b =	5·8		5·8
Meter .. 60° F.		b =	5·8	$7a + b$ =	38·0
		c =	6·2	$6{\cdot}6c$ =	40 9
Effluent gas, 62° F.		d =	5·30	$6{\cdot}6c - (7a + b)$ =	+ 2·9

		B.Th.U.
Effluent gas—dry bulb = e =	+ 1° F.	
$0{\cdot}0022\,de$ =	+ 530 × ·00022	= + 0·12
$0{\cdot}15\,(6{\cdot}6c - 7a + b)$ =	2·9 × ·15	= + 0·43
Correction to be added to calorimeter result ..		+ 0·55

Log. 3 × 3·968 = 1·0757 (⅓ cubic foot and conversion to B.Th.U.)

Log. 1 ÷ tabular number = ·0031 (correction for volume of gas)

Log. 19·17 = 1·2826 (rise of temperature)

Log. 2·305 = ·3627 (litres of water collected)

Log. 529·8 = 2·7241 (uncorrected calorimeter result)

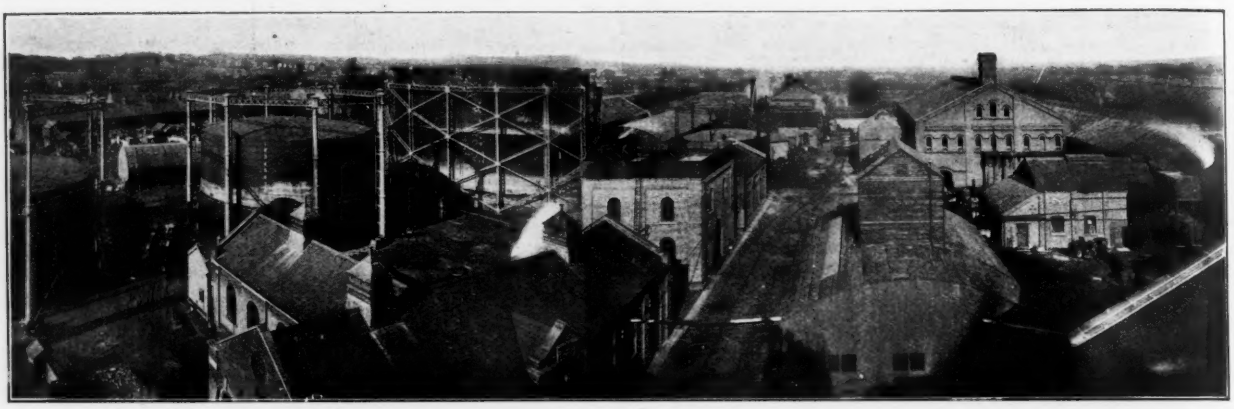
Correction + 0·6

530·4 = Total heat value.

MEETING HEAVY DEMANDS AT ALDERSHOT.

Some Facts Regarding a Busy Undertaking.

EVEN in the most peaceful times, Aldershot and its neighbourhood have been accustomed to "go ahead" in a manner which calls for unceasing activity on the part of those who undertake to look after the needs of the community; but recent events have been of a character which foreshadows a permanently augmented demand for such activity. Always full of life, Aldershot now fairly bubbles over with it. It will probably be giving away no military secret to state that a consequence of the participation of Britain in the mighty struggle at which the world now stands aghast has been to increase the population in the supply area of the Aldershot Gas, Water, and District Lighting Company from 50,000 to 200,000; and when peace is restored, it will no doubt be found that much of the increase will remain. This, of course, is only one example of the problems which are liable to confront those who aspire to serve the inhabitants of such a locality, and which should be borne in mind in connection with the recounting of some of the impressions gained and information gleaned during a tour of as much of the Aldershot Company's district as could be conveniently covered during a winter's day, in a "hustling" motor-car, and under the personal guidance of Mr. R. W. Edwards, the General Manager.



Photographs by GALE AND POLDEN, LTD., *Aldershot.*

PANORAMIC VIEW OF THE ASH ROAD ALDERSHOT) GAS-WORKS.

Consideration may, by way of preface, be given to the past work and present position of the Aldershot Gas, Water, and District Lighting Company, without any further reference whatever to the influence of military affairs, than merely to point out that the latest figures which may be quoted in this connection must have been to a large extent governed by them. The enormous addition to the population was, however, an emergency which found the Company prepared; for growth of demand in normal times has been so rapid that it has always been necessary to keep well ahead of current requirements. Indeed, from this cause, some part or another of the big undertaking may usually be said to be in a "state of transition;" and this, as a matter of fact, is particularly the case with the gas-works at the present moment. The Company take pride in reflecting that they are the only statutory concern on whom have been conferred powers for the supply of gas, water, and electricity. With such a field open, no one connected with the business need complain of insufficient scope for energy. To what a large extent the opportunities presenting themselves have been taken advantage of, is proved by the results achieved.

THE COMPANY AND ITS HISTORY.

But first of all a few words may be devoted, by way of preface, to the undertaking as a whole. The date of the formation of the Company was 1866, when a Special Act was obtained, which was followed at intervals by two Provisional Orders. Then, thirty years after the date of the first Act, another one was secured, under which the North Camp and Farnborough District Gas Company, Limited, was acquired; the area of supply including the War Department lands now occupied by the exceedingly important Royal Aircraft Factory and other military establishments. Another thing which this Act did was to bring within the Company's area the valuable and growing Camberley district. No more than five years had passed when Parliament was again successfully approached—this time with the result that the parishes of Fleet, Cove, Crookham, part of Yateley, and Seale were all brought in.

After a lapse of a further period of eight years, the Hartley Wintney Gas and Coke Company, Limited, and the Odiham Gas and Coke Company were, in the same way, taken over, with their areas of supply. This Act was passed in 1909; and, besides the other objects mentioned, it altered the name of the Company from the Aldershot Gas and Water Company to its present title, and gave power to supply electricity for public and private purposes in a number of parishes—not including Aldershot, which has an electricity works of its own.

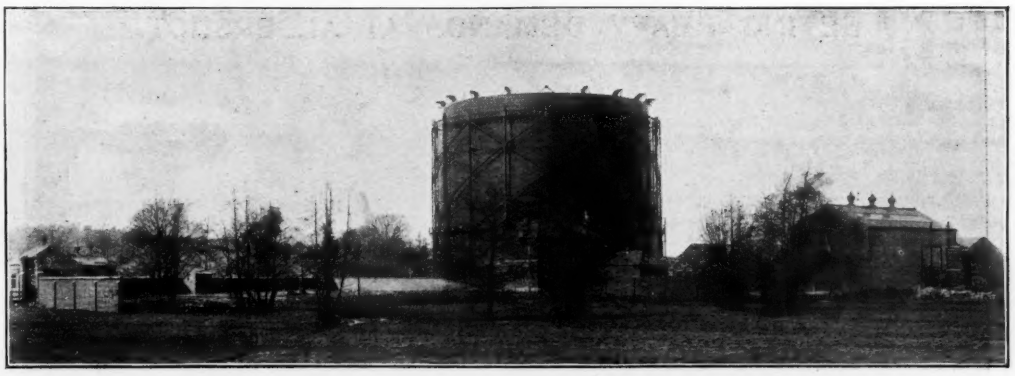
Now, the area controlled by the Company amounts to no less than 120 square miles—comparable to the Isle of Man—extending over 28 parishes in Hampshire and Surrey.

SIXTEEN YEARS' PROGRESS.

This, then, is the constitution of the Company; and it will be admitted that the extensive powers conferred by Parliament at different times of themselves afford striking testimony to the live nature of the administration of the undertaking. To indicate the progress made, it is necessary to find a starting-point; and a convenient date to take will be that at which Mr. R. W. Edwards came from Liverpool to take up the position of Secretary, and later on of General Manager, to the Company. This was sixteen years ago; and the period which has since elapsed has been one upon which the Directors and Mr. Edwards can look back with a very solid amount of satisfaction.

The capital at the end of last year (including a sum added on consolidation) was roughly three times as much as when Mr. Edwards joined the Company. That is to say, in 1898 the share capital was £116,422, and the loan capital £22,254; whereas in 1914 the figures respectively were £344,087 and £69,950. As to the operations of the Gas Department, in the same period the number of consumers has gone up from 2156 to 10,073; and the length of mains, from 33 miles to 144 miles. The make of gas for the year ended Dec. 31, 1898, was 137,618,000 cubic feet; and for 1914, it was 401,461,000 cubic feet. All these figures, of course, have to be considered in conjunction with the extensions of area and acquisitions of other undertakings already referred to; but they are a record of hard, unceasing, and successful work on the part of all concerned. In the half year to December last, the increase in the sales of gas (exclusive of works and special contracts) amounted to nearly 11 per cent. There was then no question of the output being affected by further amalgamations; but over practically the whole of the period the "war influence" made itself felt.

That the work has been successful from the point of view of the consumer as well as from that of the Company, is evident from a study of the prices charged for gas. In Aldershot, the charge to ordinary consumers in 1898 was 2s. 9d. per 1000 cubic feet, and at September last the figure was 2s. 4d.; while in Farnborough the price had been reduced from 4s. to 3s. At Michaelmas, it was found necessary to increase the price in both cases by 4d. per 1000 cubic feet; but this, it will be understood, was consequent on the abnormal conditions existing, and not owing to anything which was within the control of the management. So far as the outlying districts subsequently taken into the Company's area are concerned, there is a varying scale of charges in operation, of a nature no doubt equally favourable to consumers; but here, of course, also the 4d. increase was applied last autumn. In connection with the different prices in the several areas, it should be mentioned that there is a rebate of 6d. per 1000 cubic feet allowed on all gas used for cooking, heating, and motive power, when



GENERAL VIEW OF THE NORTH CAMP (FARNBOROUGH) GAS AND ELECTRICITY WORKS.

separately registered. For this purpose, rebate indicators are largely employed—and with success, as an article by Mr. Edwards in our columns in days gone-by amply showed.

The Head Offices.

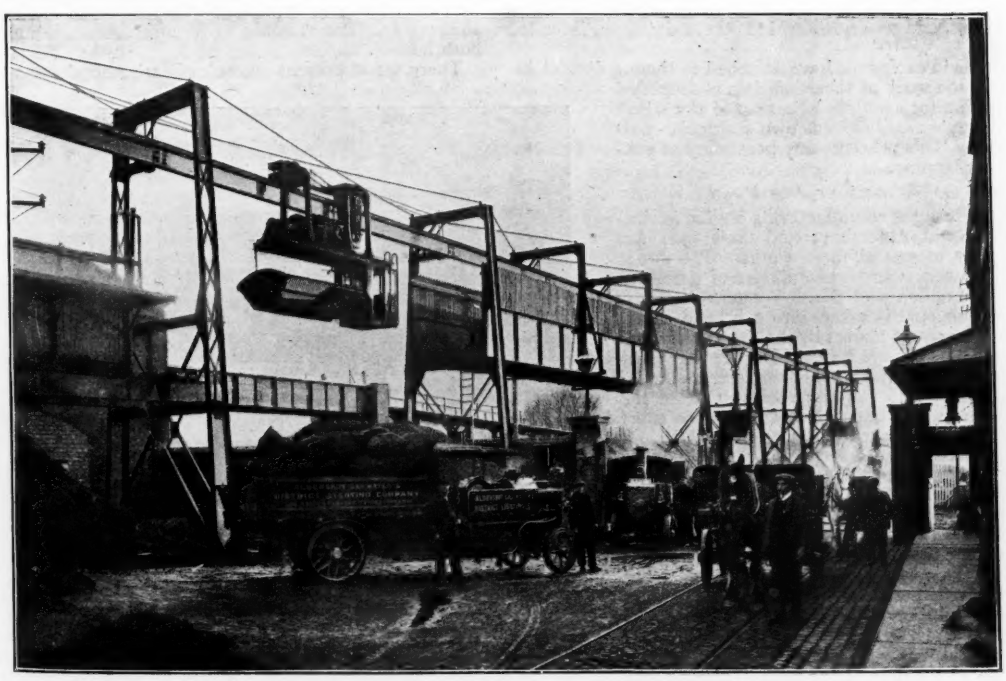
For administration purposes, the Company some ten or twelve years ago provided themselves with a substantial building, centrally situated in Victoria Road, Aldershot. There is a good deal of accommodation here; but already it is proving unequal to the requirements of the work that has to be done, and workshops at the back are to be removed, to give increased office and showroom space. There is a representative display of gas consuming appliances so arranged as to attract the notice of customers transacting business at the counter; but it is intended to present to the eye of the caller a much more imposing array of the most modern cookers, fires, water-heaters, &c., when the necessary space is available. A peep (on the way upstairs to the Board-room and Manager's office) into the telephone room satisfies one that all the works, branch depôts, &c., are in close touch with the head office —an important point where so large a district is concerned. A private branch exchange is in operation, yielding valuable co-ordination and speeding-up.

At the back of the main offices, there are a number of stores, as well as shops for the carrying out of cooker repairs; and it is the removal of these—and the concentration of the whole of the stove repairing and fitting shops at the Farnborough works—which will afford the necessary facilities for the extensions just referred to. It is noticed that there is provision here for the testing of all meters that are repaired, both water and gas. There is also a small laboratory and photometer-room, and a complete breakdown plant, for dealing with accidental damage to both gas and water mains.

Distribution Work.

An entire system of high-pressure gas supply for Aldershot Town is worked from this point; there being installed for the purpose Bryan-Donkin compressors and gas-engines, in duplicate, each of a capacity of 50,000 cubic feet per hour, which raise the pressure of the gas to 3 lbs. The gas is drawn from large feeder mains, and distributed at high pressure through steel mains to the consumers. This installation has enabled the Company to undertake, with most gratifying results to both themselves and the consumers, a large amount of outside lighting. In the shopping centres, the groups of high-pressure lamps are quite a feature and—despite increased competition—are more than holding their own. In connection with the compressing plant, a small fact serves to illustrate the businesslike methods by which the affairs of the undertaking are conducted. All the running gas and water supplies are accurateiy metered, and charged at the ordinary rates; and, throughout, the high-pressure scheme "stands on its own legs." It is the same with all the Company's various departments. In their activities, each financially fights its own way ahead, and operates absolutely on its own basis. Thus the spirit of endeavour—which is the soul of progress—is maintained.

Passing through the different stores, attention is attracted by various points about them, but mainly, perhaps, by the convenient and orderly manner in which everything is arranged. These are characteristics which, in connection with such work, become more and more desirable, with the great increase in the number of appliances, fittings, and parts which it is necessary for any undertaking to stock which aims at satisfying every need or wish. The articles required are, of course, not in all places the same; and at Aldershot there is, in large quantity, one thing in particular which is not to be found everywhere. Various outlying districts, which came into the area of supply when other companies were absorbed, receive their gas at high pressure. For this purpose, there have been provided at various points pumping stations, by means of which a thoroughly efficient supply of gas to all points is assured. As, however, the small companies acquired were possessed of the customary accompaniment of small mains, it was not found practicable to put down district governors, and so the villages are being service governed. For the past five years, diaphragm governors have been used very extensively for this purpose; and when once the men had become



VIEW OF THE NEW TELPHER TRACK AND BRIDGE; ALSO SHOWING THE ENTRANCE TO THE ASH ROAD GAS-WORKS AND THE COMPANY'S TWO 3-TON "GARRETT" STEAM WAGGONS.

EXHAUSTER ROOM AT THE ASH ROAD (ALDERSHOT) GAS-WORKS.

[Showing the new 60,000 cubic feet per hour Bryan-Donkin exhauster.]

used to them, they were found to work practically without any trouble. But it was thought that with the mercurial pattern there would be greater certainty of the governor acting under all conceivable circumstances; and this explains the presence in the stores of so many governors of this type—but of a special design which Mr. Edwards has had made for the Company's use.

Branch Show-Rooms.

It is generally agreed nowadays that nothing on the distribution side of the gas business is more worth looking carefully after than the show-room accommodation; and in this respect full advantage is being taken by the Company of the ample opportunity which their circumstances afford. With so large an area, it has been found possible to usefully provide five district offices and show-rooms, in addition to the display at Aldershot—namely, at Camberley, Farnborough, Fleet, Hartley Wintney, and Odiham. It would be doing less than justice to refrain from complimenting those responsible upon the excellent taste and judgment brought to bear on their arrangement. The all-pervading air is one of restfulness and refinement. Everywhere crowding has been avoided; and the aim has been to display just the kind of apparatus and fittings which are likely to appeal to the residents of the locality. As it would be manifestly impossible here to describe all of them, the temptation shall be resisted of making specific reference to any. In some cases, gas is seen alone, and others side by side with electricity. The fittings shown for each are of the style demanded by consumers possessing an artistic eye; and it will be found that the innumerable patterns of Bland fittings for gas are in no degree behind others which are intended for electricity.

These depôts in each case have attached to them a district inspector; and the work of these officials is simplified by the provision for each one of a map of the whole of the Company's area, with his own particular portion coloured. This prevents any possibility of confusion or over-lapping.

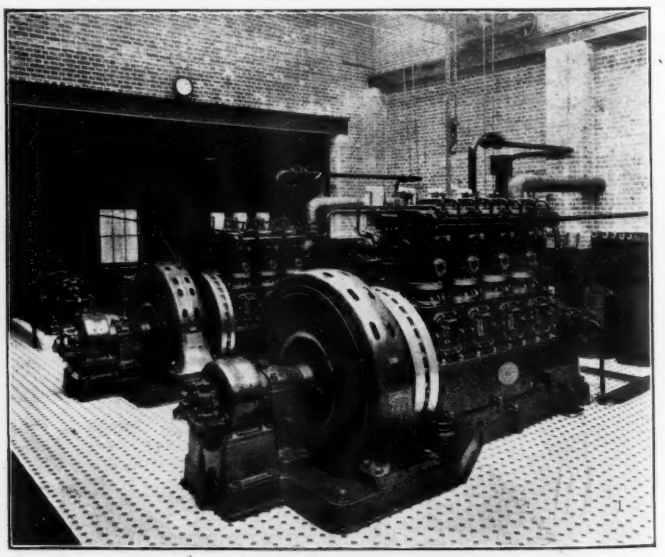
The Gas-Works at Ash Road.

The Company's gas manufacturing station is situated in Ash Road, Aldershot; and their 1909 Act included power to extend these works. The site is favourably situated, with three-quarters of a mile of sidings to the London and South-Western Railway, from which the coal is taken into overhead stores parallel with the retort-houses by the Company's own locomotives. The coke is brought out of the works by a telpher, dropped into a hopper, screened, and can be fed direct into railway trucks. One of the extension schemes now in progress will have the effect of doubling the present capacity for coke-breaking and screening. There is also a large bag trade in coke; and in connection with this the Company utilize two 3-ton steam waggons, two commercial motor-vans, and numerous horse-drawn lorries of their own. Both the overhead rails to the retort-houses and the telpher running parallel with it, cross the public road which divides the works from the sidings proper; but there is a bridge erected under the telpher, so as to obviate any possibility of accident.

Should the stores be full at any time—they were, it may be parenthetically remarked, in exactly the opposite case at the date of the writer's visit—there is plenty of ground available on which to stock the coal; and then, when required, it is picked up again by a steam-grab, and deposited in waggons for transfer to the works. The grab used for this purpose is a handy appliance; for, with small expenditure of time and labour, the long jib can be removed and a shorter one be put in its place, so that it can be employed to grab in the retort-house stores. These stores are divided into compartments, both for the purpose of separating the coals and so as to prevent spontaneous combustion. Ferro-concrete bunkers on the Coignet system have also been put down. The coal is passed from the stores through shoots to the breakers in each retort-house; and here matters are so arranged that, by a simple movement of slides, it will either go through the breakers or bye-pass them, in the case of small coal, before being elevated to the conveyor. Or trucks of small coal can be brought in on the ground-level, and fed direct to the elevator through an opening in the wall dividing the retort-house from the coal-store.

Just now No. 1 House only is in use; this containing ten beds of eight retorts, in which eight-hour charges of 8 to 9 cwt. are worked. Stoking is by a Fiddes-Aldridge machine, which, by the aid of a turntable, can be transferred along the works tramway to No. 2 House. This house contains eight beds of eight retorts, all of which are now in course of alteration. The house is being adapted for a second Fiddes-Aldridge stoking machine and telpher coke-handling plant, which will be extended from No. 1 to No. 2 house, and then pass right on to the end of the works, where it will feed the water-gas plant. There will then be in operation a very complete telpherage scheme, the carrying out of which is in the hands of Messrs. Dempster and Sons. Rails will be in position between the retort-houses, so that the stoking machines will be made interchangeable. Retort-house governors are fitted in duplicate in both houses.

There are at present two sets of carburetted water-gas plant on



ELECTRICITY GENERATING STATION AT THE NORTH CAMP WORKS.

[Showing the Browett-Lindley Multi-Cylinder High-Speed Vertical Gas-Engines coupled to the Siemens' Single-Phase Alternators; also a small "Gardner" Multi-Cylinder High-Speed Vertical Set.]

Cutler's system, each of a capacity of 400,000 cubic feet per day; and this plant is to be extended. But even these additions to the gas-making capacity of the works may not suffice to carry the Company on for very long; and it would not be in the slightest degree surprising to learn shortly of another carbonizing installation being erected.

The condensing and washing apparatus is all housed. There are four condensers; and water-gas tar to take the naphthalene out of the gas is pumped to the tops of three of these—missing the fourth. One of the two Livesey washers is also charged with carburetted water-gas tar, as well as a section of the Walker combined machine. In addition to these, the gas is treated in a Holmes rotary washer-scrubber. It is noticed that all the pipes about the works are so placed as to be very readily accessible. Oxide alone is used for coal-gas purification; but for water-gas there are four oxide boxes and one lime. The coal-gas purifier shed is open on one side; and this and the revivifying shed are lighted by electricity. The water-gas purifiers, on the other hand, are entirely in the open. The exhauster-house, which has elegantly tiled walls and floor, contains three exhausters—one of 80,000 and two of 60,000 cubic feet per hour capacity. There is also a pump-room with three machines which are used for boosting gas to the North Camp (Farnborough) Station. An interesting point may be here mentioned—that, by special main-connections at North Camp, balloons are filled direct with gas, in the ample grounds there, for the Naval Flying Corps, at the rate of 100,000 cubic feet per hour. As a matter of fact, gas can be sent to any part of the district from this point; but this practice is not being followed. The gas all goes to Farnborough, and is there redistributed. Of the three station-meters, one attracts special notice. It is used to supply the Government in bulk, and bears the Sales of Gas Act stamp.

Another scheme at present in hand is the installation of a new Wilton sulphate of ammonia plant, which will have a capacity of 4 tons a day. It will be provided with a centrifugal dryer and closed saturator, and will be housed in a new substantial brick building, so arranged that the plant can be duplicated. The effluent from the sulphate plant is treated in breeze beds, which take out the lime and reduce the temperature to 100° Fahr. More is going to be done, too, in the way of the preparation of treated tar, for which there is already an excellent demand in the neighbourhood.

On the works there is a complete half-hundredweight coal test plant, and a well-appointed fitting shop, with lathes, drilling-machines, and a gas-engine drive. The chemist is provided for by a complete laboratory and photometer-room; and recording calorimeters, &c., are placed in all necessary positions, the charts being taken off and forwarded to the head office each morning. Recording instruments are also installed at the various other depôts.

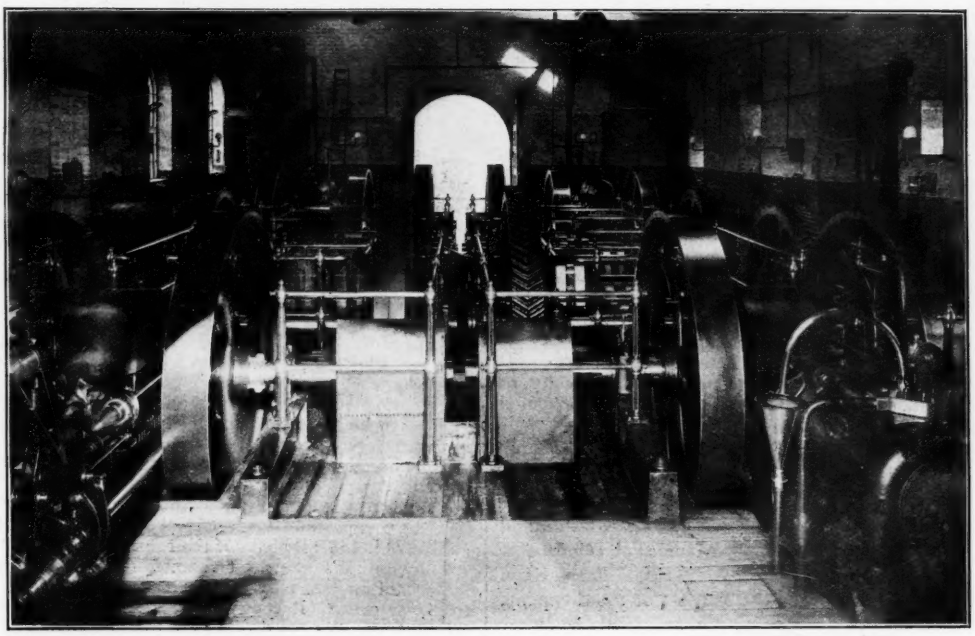
Electricity Supply.—The North Camp (Farnborough) Station.

There is also at Ash Road an electric power-house, the dynamos in which are driven by 60 B.H.P. Browett-Lindley high-speed multi-cylinder gas-engines. The direct-current system is utilized. The Company have powers to supply adjoining areas outside Aldershot township; and these they are now exercising. Due provision for additional generating plant has been made in the power-house. Current is employed for the stoking machinery and the telpher, as well as for coal breaking and conveying; and it will be used also for other purposes, such as the coke-lift in the carburetted water-gas house, and lighting generally.

The other electricity generating station erected by the Company under their powers is at Farnborough, where the system is high-tension, single-phase, alternating current. Here, as at Ash Road, the current is generated by Browett-Lindley engines (with a small Gardner engine to keep the cables charged when there is no consumption); and in both cases the Company's own gas is used. The plant is well housed; and in all respects the most modern devices have been employed. The completeness of the installation is instanced by the fact that a 5-ton travelling crane is provided to facilitate repairs to the machines.

A Distributing Station and Prospective Gas-Works Site.

In addition to the electricity installation, the Company make good use of the works of the old Farnborough Gas Company in connection with the gas portion of their business. There is here a splendidly situated site, with ample ground space available, for an entirely new gas manufacturing station, when the Aldershot Company should find new works preferable to the further extension of those at Ash Road. There is first-rate railway accommodation, by sidings connected with the South-Eastern and Chatham Railway Company's main line to Reading. At the present time, this station is employed for distributing gas to the different districts; and it is here that the workshops are in due course intended to be centralized. Besides the usual district governors, there is installed a Keith anti-fluctuator governor,



THE WATER-WORKS PUMPING STATION, BOXALL'S LANE, ALDERSHOT.

[Four sets of deep-well pumps—Capacity of each, 20,000 gallons per hour—driven by 72 effective horse-power horizontal gas-engines.]

which is found perfectly satisfactory in operation, and admirably fulfils the special purpose for which it is intended. It was put down to prevent any pulsations due to the large gas-driven electrical generating sets upsetting district pressures by the pull necessarily involved. It performs the duty of an immense gas-bag, as well as giving a fixed outlet pressure to the gas-engines of the electrical station. There is also a rotary meter of a capacity of 100,000 cubic feet per hour for measuring high-pressure gas at anything from 20 inches upwards.

Entering the old retort-house of the Farnborough Company, one notices that it is now being utilized as a motor-garage for commercial delivery vans; and one sees a small machine which has been in use for several years with a markedly beneficial effect on the leakage account. It is worked by a petrol engine, and charges with air each section of main, as laid, to a pressure of 30 lbs. per square inch—each joint being then tested with soap and water. Then, when the job is finished, the whole length is tested again at this pressure. This is an idea which Mr. Edwards got from the South Metropolitan Gas Company.

The Water-Works.

There have been so many points in connection with the other departments to which to refer, that but little space remains at disposal in which to deal with the water side of the undertaking. In earlier times, water was obtained at a comparatively shallow depth from the Bagshot Sands; and the Company still take from this source for their own purposes anything up to about 50,000 gallons a day. But as the consumption over the district grew,

these sands became an insufficient source; and now the whole of the water distributed is drawn from the chalk below. For this purpose, a system of artesian wells has been driven to depths varying from 300 to 400 feet. There are about a dozen of these tubes; the diameter of the largest being 14 inches. They are coupled-up with the general underground system; the water being conveyed in pipes through galleries to the various sets of pumps. All these tunnels are electrically lighted, by means of a plant driven by a small gas-engine. The Company have in Boxall's Lane 12 acres of land, over which the wells are sunk; and with the demand for water growing so rapidly, large extensions of the system are now in hand, for which there is ample room. A new complete station is being erected, with provision for two pumping units, each of 40,000 gallons per hour capacity.

There are already two pumping-stations. The principal one, which came into use about 1894, is an elegant building, amid park-like surroundings, with well-kept lawns and flower-beds, in which the Company justly take pride. The pump-room is filled with machinery; there being four sets of deep-well pumps, each of a capacity of 20,000 gallons per hour, driven by 72 effective horse power horizontal gas-engines, all using the Company's own gas. There is one large well for the four sets; and one set at least is always kept standing. The pumps can be separately transferred to the high or low level supply. They are direct-driven; and three of them are fitted with Citroen gear, which is remarkably quiet in action. This gearing, of cast steel, with machine-cut helical teeth, though high in initial cost, amply justifies its introduction by the saving in wear and tear and smoothness of turning moment, due to the wonderful accuracy of the machining.

Requirements beyond those satisfied by this house are met by the aid of an auxiliary steam plant. This is in a station which was commenced as far back as 1865, and has since been added to from time to time as the business grew. There are four sets of pumps and four wells; and one or more of the sets can be used as desired; the capacity of the station being roughly speaking 60,000 gallons an hour. Except a little coke, breeze from the gas-works forms the principal fuel for the boilers. From the sources named, it is estimated there will this year be derived a supply of water approaching 500 million gallons.

In connection with the reservoir station, at Cargate Hill, it may be pointed out that the storage it has been necessary to provide does not represent anything like the output, as a very large proportion of the water goes direct to the various Government storage tanks, which the Company fill, by means of a special system of rising pipes. For the Company's high-level service, there is a water-tower, of a capacity of 60,000 gallons. The storage consists of two reservoirs holding 400,000 gallons each, and one of a capacity of about 2,000,000 gallons. All these are under cover; and, in fact, the water does not see daylight from the moment when it is drawn from the earth until it reaches the consumers' taps. The arrangements are of the most elastic character, to meet both high and low level demands. Everything connected with the water supply is controlled from this station, which is prettily laid out, and offers plenty of facility for extension.

What has been written, though it merely touches on the outstanding features of the works for the supply of gas, water, and electricity in the Aldershot district, affords sufficient evidence of the fact that a "strenuous life" is led by Mr. Edwards and those associated with him in carrying on the business of the Company.

THE MONAZITE SANDS OF TRAVANCORE.

At the annual meeting of the Mining and Geological Institute of India, held in Calcutta early in the present year, the newly-elected President (Dr. H. H. Hayden) referred to the monazite sands of Travancore. These sands, it may be remembered, were the subject of some articles and correspondence in the "Journal" towards the close of last summer; and Dr. Hayden, alluding to them, called attention to the fact that until quite recently the world's supply of monazite was derived from sands in Brazil, but that the discovery of similar sands on the coast of Travancore and Cochin had enabled India to enter the market, and create an industry worth upwards of £40,000 in 1913. The monazite, which is derived from gneisses of the Travancore hills, is one constituent of the sands along the seashore; and in certain places selective action by the waves on these sands has led to the local concentration of large quantities. The sand, which is still further concentrated by artificial means, was, until the war broke out, exported to Germany, where the thorium was extracted for the manufacture of gas-mantles. Other buyers will now have to be found; but, as Dr. Hayden observed, this is not likely to be a matter of any difficulty.

The records of the Geological Survey of India recently received contain a paper of Mr. G. H. Tipper, F.G.S., dealing with these sands, the monazite-bearing character of which was discovered by Mr. C. V. Schomberg, acting on behalf of the London Cosmopolitan Mining Company, in 1909. Shortly afterwards, Mr. Tipper had an opportunity of examining them; and the results are embodied in his paper. He goes in great detail into the geology of Travancore, over which monazite is widely distributed. There are, however, only a few places where concentration has given rise to deposits of sufficient richness to be called monazite sands; and they are all in the vicinity of the sea coast. Between the productive spots there are long stretches of barren sand with only faint traces of monazite. Although each deposit has certain peculiarities, all present a great many features in common. In colour they are usually black, due to the presence in predominating quantities of magnetite and ilmenite. They are sometimes red when garnets are in excess; and where there is abundance of quartz or calcite, a grey sand is produced. Excess of monazite gives a yellowish tinge. With the exception of quartz and calcite, the densities of the minerals vary from 3 to 3·5. In the sands monazite occurs in small rounded crystals, from 0·1 to 0·2 mm. in diameter. Its colour is best described as resembling amber; and its density is 5·191. Considering that the sand dunes represent material blown from the shore, it is merely a question of the relative sizes of grains of the different minerals, assuming that they are all the same shape, as to whether the wind is strong enough to drive them along. If the grains are considered to be approximately spherical, the relative volumes of quartz and monazite which can be moved by the same means are as 2 : 1. Near Cape Comorin, at low tide, the beach is often a glistening mass of rounded grains of yellow monazite. A thick layer of concentrated sand indicates a long-continued period of quiescent conditions.

Monazite was first discovered by Mr. Herbert *in situ* in association with the graphite of South Travancore; and later on M. Masillamani found it in the younger pegmatites. Mr. Tipper says the association with graphite is interesting. In the graphite mine at Vellanad, 16 miles north-east of Trivandrum, monazite was found in a rock filling a fault crack. This rock is composed mainly of brownish crystals of monazite in a matrix of felspar with a little quartz. Thin veins of graphite cut the rock, and are later than either of the other minerals. The monazite, yellow in thin sections, often encloses small patches of a reddish-yellow mineral which Mr. Tipper suggests may be thorium silicate. On its discovery, this rock was supposed to be entirely secondary; but it is more probably a very rich patch of monazite-bearing pegmatite. Specimens showed monazite occurring at small veins in masses of graphite. In these, however, it had a very decided greenish tinge. There seems, however, to be in Travancore some connection between the pegmatite intrusions and graphite.

After Mr. Tipper's examination of the monazite sands, he came to the conclusion that the mineral must occur as an accessory in the gneissose rocks which occupy so large a portion of Travancore. It seemed to him that in this way only could one account for a mineral so widely spread and so abundant. He could not verify this supposition by an examination of such rocks as he was able to collect; but he does not yet think it is proved that monazite does not occur in these rocks. The estimation of the thorium content of the monazite was undertaken by Dr. W. A. K. Christie. The material selected was not a sand or a concentrate, but was prepared from a specimen composed of monazite, felspar, a little quartz, and graphite. It was first hand-picked, and then the separation completed with a heavy liquid (Sonstadt's solution). It was thus possible to prepare monazite free from zircon or any other mineral likely to complicate the analysis. The amount of thorium present as ThO_2 was 6 per cent.; that of silica, 1·55 per cent. The molecular ratio of thoria to silica was 1 : 1·3. The thorium was present was a normal silicate. Two analyses were published in the "Bulletin of the Imperial Institute" in 1911 without any author's name. The amounts of thoria present in two samples of magnetically separated sand were respectively 8·5 and 10·08 per cent.* Recently Mr. S. J. Johnstone has given 10·22 per cent. and 8·65 per cent. as the thoria contents of two samples of Travancore monazite, isolated from concentrates.† These results indicate a considerable variation in the amount of thoria present in the monazite.

The following notes, given by Mr. Tipper, are based upon an examination of a number of sands and concentrates brought to Calcutta at different times. From what has already been written, he says it seems natural to conclude that monazite is most likely to occur in those parts of India where charnockites are well developed. The sands have, however, not been collected with sufficient care to settle the question accurately. Of the states and districts bordering on Travancore, sands from Cochin did not show any trace; while it occurs widely in the Tinnevilly district in the older dunes, in the dry beds of streams draining eastward from the hills, and in the beach sands, where they have undergone slight concentration. It has not been noticed in the sands from Ennore, near Madras; but it occurs in the streaks of black sand at Waltair, and at Bimlipatam. Similar streaks near the entrance to the Chilka Lake in Orissa also contain it. Sands from the pegmatite districts of Nellore and Bihar and Orissa have so far failed to yield any trace. It occurs sparingly in concentrates from Idar Central.

* See "Journal," Vol. CXV., p. 544.

† See "Journal of the Society of Chemical Industry," Vol. XXXIII., p. 57; and this "Journal," Vol. CXXV., p. 97.

The London and Southern District Junior Gas Association will next Saturday afternoon pay a visit to the Old Kent Road works of the South Metropolitan Gas Company. On Friday, the 26th inst., there will be a business meeting, when Mr. R. A. Briggs, of the South Suburban Gas Company, will read a paper entitled "Some Phases in Distribution."

EFFICIENCIES OF RADIATING BODIES.

A Bolometric Method for their Determination.

At the Meeting of the Royal Society last Thursday, a paper, the joint production of Dr. W. A. Bone, F.R.S., Professor H. L. Callendar, F.R.S., and Mr. H. James Yates, describing a bolometric method of determining the efficiencies of radiating bodies, was read by Dr. Bone. The following abstract of the paper has been issued by the Society; but we hope to be able to publish in a subsequent issue of the "JOURNAL" fuller details of the new bolometer and the method of employing it.

In view of the increasing uses of incandescent surfaces in heating operations of all kinds, the authors investigated, as a scientific problem, the measurement of radiant efficiences of such surfaces by a bolometric method which can be standardized by direct comparison with a radio-balance, and which the authors propose to substitute for the existing "water-radiometer-cum-thermopile" method (known as the "Leeds Method") used hitherto.

The authors described the construction and use of a new bolometer, specially designed for the purposes in view, in which the radiation from an incandescent surface falling on a blackened coil of platinum wire can be determined in absolute units for the increase in the electrical resistance of the receiving coil, the area of which is sufficiently small to allow of the instrument being standardized from a source of known intensity. By way of example, the application of the method to the measurement of both the absolute radiation of a gas-fire and its "distribution factor" was described and discussed.

The new method is not only in every way more accurate and reliable, but is also more rapid, than the old one, and has the further great advantage that, if necessary, it can be made automatic, and therefore independent of the "personal error" of an individual operator by the use of a recording device.

THE GAS-FURNACE EXHIBITION AT SHEFFIELD.

Lectures on Pyrometry and the Combustion of Gas.

THE exhibition of industrial gas-furnaces, which has been held at Nursery Street, Sheffield, for the last four weeks, under the auspices of the Brayshaw Furnaces and Tools Company, Limited, was brought to a close on Saturday evening. The public interest in the various demonstrations which have taken place was sustained to the end; and a considerable stimulus has undoubtedly been given to the use of gas for industrial purposes in Sheffield and the neighbourhood. A more suitable time for the holding of the exhibition could not possibly have been selected, as, owing to the enormous demand for war material, and the great trade boom which is being experienced, the Sheffield steel firms are working at the highest conceivable pressure. The demand for steel has been, and remains, so much in excess of the capacity to supply, that manufacturers have been only too willing to listen to those who were able to show them improved means and appliances for the more successful and economical application of heat in the different operations of treating steel.

In connection with the exhibition, a series of three lectures was given, on subjects bearing on the local industry. The first, which was by Mr. R. S. Whipple, of the Cambridge Scientific Instrument Company, Limited, who took as his subject "Modern Pyrometry," was held in the exhibition building; but so large was the attendance that for the remaining lectures an adjoining schoolroom had to be engaged. Mr. Whipple held the attention of his numerous audience as he described the remarkable developments that have been made within recent years in means for accurately determining and recording the highest furnace heat, and for detecting very slight variations in temperature. But as much of the interest of the lecture centred in the illustrations on the screen, no abstract would do it justice. On Tuesday, the 23rd ult., Mr. S. N. Brayshaw lectured on "Some Experiments upon the Quenching of Steel"—a subject which does not directly interest "JOURNAL" readers. The third and last lecture was delivered on Monday, the 1st inst., by Mr. E. Russell Brayshaw; his subject being "Some Experiments in Gas Burning."

In his introductory remarks Mr. Brayshaw made most generous acknowledgment of the encouragement and support which have been given by the Sheffield Gas Company to the efforts made to further the industrial applications of gas; the Company having given in this matter a progressive lead that other towns might well follow. Going on to speak of the circumstances of his firm's taking up the designing and manufacturing of industrial gas-furnaces, he said that some ten years ago they were needing such furnaces for their own special processes of tool hardening. They conceived the idea of a salt bath furnace, and ordered one to be made to their requirements. In accordance with the customary practice of that time the furnaces they obtained were heated by numerous small bunsen burners, which were a constant source of trouble, and, moreover, they did not give anything like the maximum efficiency in combustion. The firm, therefore, set to work to construct burners which would be easier to handle and would give a higher efficiency. From 24 burners they proceeded by various steps to reduce to two; and these two were placed in such a position that they could be quite easily controlled and adjusted by the operator.

They next turned their attention to the design of the burner itself. The ordinary bunsen burner, using gas at normal town pressure, is unable to draw in sufficient air to ensure complete combustion. This may be corrected to some extent by introducing auxiliary or secondary air at the point of combustion; and for this purpose natural draught gas-furnaces have to be connected to a flue which provides sufficient "pull" to draw in what air is necessary. The problem then was to obtain, with gas at two inches pressure, as much air as possible in the mixing-chamber, at the same time maintaining sufficient velocity to avoid lighting-back. In their solution of this problem they finally arrived at the type of bell-mouth burner, in which the air is introduced with the minimum of friction, being drawn in on the injector principle, gradually accelerating in speed to a narrow neck into a wider chamber beyond. This type of burner proved itself far more efficient than the old system of multiple burners, and it has been applied to large furnaces where uniform heat is essential. At the present time lead pots, holding 7 tons of metal, are being heated with as few as four or five burners, which give a beautifully uniform heat, are extremely easy to manipulate, while the gas consumption shows most marked improvement on the old type.

Reference was made to the Méker burner, in which the difficulty of lighting-back has been overcome by inserting a nickel grid between the flame and the mixing-chamber. Mr. Brayshaw said he could recommend the burner with confidence; but for large sizes the expense of the nickel grid has to be borne in mind.

With regard to the distribution of high-pressure gas—that is, of approximately 10 lbs. per square inch pressure—the lecturer held that, while it was obviously of advantage to those who wish to obtain high temperatures without having to run a compressor, there was scope for further experiment before it could be introduced upon an extensive scale. One disadvantage was the noise produced by combustion; and a further disadvantage lay in the greater necessity of maintaining good joints in the supply pipes. Where high-pressure gas could not be obtained from the town mains, and it was a case of deciding whether to compress gas or air, Mr. Brayshaw would prefer to compress the air. In the first place if air escaped through leaky joints it would merely assist in ventilating the room; but if gas escaped, the consequences might be serious. Then, with gas, the relative leakage was aggravated, because gas, being of a lower specific gravity, would penetrate through a leak easier than air.

After describing, with the aid of diagrams and actual examples, the various steps leading up to the design of their latest type of high-pressure burner, in which all the air goes through the mixer and no auxiliary air of any sort is permitted, Mr. Brayshaw concluded an interesting lecture in the following words: "I think you will agree that there is an enormous future before gas in competition against solid fuel. Far from gas being unsuitable for many kinds of work, the fact remains that it has never been efficiently tried, and we believe that what has been accomplished in the past is but the prelude to some far more important developments in the future."

ELECTRICITY SUPPLY MEMORANDA.

"UNDUE preference" and relying on the rates for support have, by a fairly extensive practice, been acknowledged by a not inconsiderable part of the electricity supply industry to be essential to its existence, under the applied commercial policy. Both municipal and company electricity suppliers have practised "undue preference" in the prices charged to consumers; and municipal authorities continue to claim undue preference over private enterprise in having the rates upon which to fall back, if they mismanage their business, and do not charge sufficient to make both ends meet, or have not for abnormal times sufficient reserves to meet deficiencies, and so, as far as possible, maintain the level of prices to consumers, as in the case of private enterprise. "Electrical Industries" discusses these matters, but does not raise any convincing point in regard to them, in connection with their criticism by Mr. Charles Carpenter, D.Sc., at the recent meeting of the South Metropolitan Gas Company, and the comments of the "JOURNAL" in the succeeding issue. Our contemporary admits the unfairness of "undue preference" in regard to prices; but it avoids, having been warned by the error of "Meteor" in the "Electrical Times" (which error "Meteor" has not, for his own credit in respect of veracity, found it expedient

Seeking Argument among the Ridiculous.

to correct), the discussion of the point from the aspect of statutory regulation. The matter was dealt with in our issue of Nov. 10 last, p. 289. "Electrical Industries" runs obliquely off the main question to another, and asks whether the puritanical gas companies do not exercise preference by the offer of free piping and free fittings, and by also refusing to connect-up cooking-stoves free where consumers do not use gas throughout the premises. People who "live in glass houses should not throw stones," and critics should exercise some common sense and discretion in the choice of subject-matter. Certainly gas companies do, under the prepayment meter system, offer free piping and free fittings; but they take good care to add to the ordinary charge for gas a sufficient sum to cover their capital outlay. As to fixing cookers free, where this is done for ordinary consumers (who, unlike electricity consumers, pay for gas used for cooking and heating the same price as is paid for gas for lighting), the hiring charge for the cooker is computed on a scale to cover all outlay associated with installation. We know of refusals to connect free-of-cost gas-cookers under the prepayment meter system where electricity is used for lighting. To connect-up a cooker only under such circumstances (which cooker might not have much use), and yet the most expensive individual part of a prepayment installation, while only charging the same additional price for gas as to the ordinary prepayment consumer, would be showing a preference to the cooker-only customer over the consumers using gas both for lighting and for cooking, and therefore paying a larger sum through the addition to the ordinary price per 1000 cubic feet. We have never heard of the refusal to fix cookers on the usual terms for ordinary consumers, who pay a fixed rental for hire and installation—whether or not they use any other agent for lighting; and such refusal would be an exception rather than the rule. Anyway, there is a distinction between single auxiliary charges of this kind for work done and the permanently running charge for the commodity which is used through the appliances. We think our contemporary has been unfortunate in its selection of material with which to fasten upon the gas industry "undue preference" in a minor matter. By the way, it was not a great while since that, at the writer's private residence, he had an offer of free electric wiring by a supply company for half-a-dozen lights on the ground floor; and it was admitted that this offer was made because it was believed the writer, as the householder would be so charmed with the light that he would, at his own cost, have the number of points of lighting extended. When the major part of a subject is finally placed beyond further argument, it does not always do to try to promote minor and ridiculously inapplicable matters into the position of apposite analogy.

A "Fundamental Injustice."

Our contemporary is no more happy in its references to the undue preference which municipal electricity undertakings have over private gas or electricity enterprise. As the same principle—the falling back upon the rates—applies to municipal gas supply, our contemporary does "not see why the 'JOURNAL' should regard this grievance as peculiarly its own." In theory the same principle does apply to municipal gas undertakings; in practice, excepting in rare instances, they are the victims of heavy profit grabbers in aid of the rates. Manchester, for instance, has had from the gas undertaking more in profits in aid of the rates than the outstanding capital expenditure; but it would be unfair to publicly indict Manchester without saying that several other municipal corporations, with an equal length of possession, run it very close. Our contemporary dismisses the point of rate-aid as being "merely one of the fundamental injustices of municipal trading when it comes into competition with private enterprise." There is no reason why any injustice, whether "fundamental" or otherwise, should be continued. We are glad to see the description applied to it by our contemporary, because the London Gas Companies propose to base their case for reform on this "fundamental injustice," and ask Parliament, in equity, not to allow it to continue, but to make a beginning with its extermination in the London Electricity Bills—if they ever advance. We do not see why "the day is past" for objecting to rate-aid, seeing that it is a "fundamental injustice." The fact that so little "rate-aid" has been given to gas supply, and so much to municipal electricity supply, is surely a point to the advantage of gas company objectors. We do not see that there is much consolation to be gained from the reflection on the part of gas companies who are up-against rate-aided electrical competition that they are not quite so badly off as electric supply companies who have to fight municipal or company gas undertakings which have not to face expropriation at the "then value" by the end of a certain number of years. There are, and our contemporary knows it, very few electric supply companies up-against municipal gas competition; and gas companies are subject to expropriation at any time if the local authorities obtain the sanction of Parliament. They are not even given the enjoyment of further existence for a term of years—a gas company this year may be by Jan. 1 next a municipal possession.

"An Appalling Prospect."

Our contemporary regards as an "absurdity." our statement that "Parliament should say that it [the London power scheme] must be conducted in such a manner as to be positively self-supporting." Why a sane business proposition should be an "absurdity" is not explained, unless we are expected to find explanation in the submission that "the application of the Bermondsey clause to the entire business of London power supply is an appalling prospect, apart from the circumstances that the raising of prices to meet a deficiency would lead to increasing the deficiency later on by reducing the volume of business." Is the charging for electric power such a delicate business that the price must be irrevocably fixed with mathematical precision, and never be subject to variation or revision according to market conditions? The "appalling" thing is that there should be any one in responsible position in the electrical industry capable of such argument in these days. It resolves itself into an argument that electric power supply is impossible on a business basis, and must be under municipal control, with the rates to support it. Our contemporary should study the matter from the point of view of the principles governing the conduct of sound private enterprise, and take as illustration the last report and accounts of the London Electric Supply Corporation. The Company do very well from power supply, without any rate-in-aid, as was seen by last week's "Memoranda." In view of this, why should electricity supply, under the London County Council, or their operating Company, without the rates to prop up the business, be an appalling prospect? The provision of reserves in good times ought to be as possible with municipal supply as with private enterprise. To have the rates upon which to fall back is a standing temptation to a departure from sound business principles; and Parliament ought not to be a party to the leading into temptation of municipal authorities, and to the stereotyping for all time of the notion that an electricity trading undertaking under municipal direction should not exist without financial support external to the business. Parliament takes very good care that gas and electricity supply companies shall stand without support external to the business. We are really surprised that any electrical paper should have to plead that municipally controlled rate-unaided electricity supply offers an "appalling prospect."

"The Enemy in our Midst."

In the same issue of our contemporary, there is further criticism of statements that have appeared in the "JOURNAL." In this case reminder is given that we recently ventured to contest an assertion of our contemporary, that a general tendency exists for corporations to support "the older and more influential" gas undertakings against electrical rivals. We hold the contrary view; and, while this view is the correct one, the corporations still expect to draw from the profits of the gas undertakings as large sums in aid of the rates as, and even larger sums than, they did before gas supply was exposed to the competition of electricity. Our own experience is that municipal authorities are inclined to pet and favour electricity supply concerns. Our contemporary says it cannot conceive what evidence we have showing the accuracy of the belief, "which runs counter to its own experience in all parts of the country." Then all we can say is that the experience of our contemporary is confined to a very limited number of electricity undertakings in each part of the country. It has never heard of municipal electricity undertakings miserably assessed for rating purposes in relation to the assessment of the gas undertaking. It has never heard of municipal electricity undertakings that are allowed to conduct financial operations in such manner that there is nothing left to contribute to the rates, while the gas undertaking must, whatever the current conditions of its markets for raw materials and secondary products, find a stipulated sum (even though prudently held reserves are trenched upon for the purpose) to go to the relief of the rates. It has never heard of municipal electricity undertakings that are so conducted that they have to "go on the parish" like the very poor. It has never heard of electricity undertakings that have their finances conducted so that there is no (or very little) provision for a rainy day. It has never heard of such electricity undertakings being paid large prices for street lighting. It has never heard of the managements of such undertakings being allowed to enter into secret compacts for the supply of energy at prices which they are afraid to divulge; and therefore no one has an opportunity of judging whether undue preference is being given. Our contemporary admits that municipal councillors are "no more competent to exercise judgment upon an electricity tariff than upon a problem of esoteric mysticism." The "mysticism" must be of a high-bred character to require the use of the term "esoteric" before it. The expression, however, serves to impress the complicated character of the bases (for there are such a number) of electricity tariffs, and how far removed from ordinary commercial principles are these tariffs. One thing more. Our contemporary has not been an observant reader of the reports of Local Government Board inquiries into applications for loans for electricity supply purposes. It has missed by negligence much that we have seen which shows that the competitor is largely favoured and petted under municipal management; while the gas undertaking is supposed to be capable of looking after itself, and not have its efficiency reduced as a profit producer.

Electricity for Workmen's Dwellings.

The electricity supply industry does not appear to be prepared to accept the verdict of much previous experience that there is not a real profit for them in the use of electricity for lighting and cooking in workmen's homes. The most that is ever done is to have a little dabble in this direction, and then to find, as others have found who tell the whole truth, and nothing but the truth, of the matter that, taking capital,

maintenance, and all expenses associated with these installations, the consumption is so small and erratic that financially the business is unsound. We see Hull have instructed their Electrical Engineer to prepare a report on the subject; and the Aylesbury District Council, in connection with their new electricity supply scheme, are contemplating the adoption of a fixed price scheme for small houses. At the municipal workmen's dwellings the Coventry Corporation are compelling tenants to patronize the electric undertaking, charging fixed prices in the rent. The Housing Committee are to be responsible for the payment of the charges; and it is understood that applications for other workmen's houses will be considered. The Housing Committee have from alternative tariffs selected a fixed flat-rate—three lamps, 7½d. per week; and four lamps, 9d., including provision and maintenance of the lamps. The users will be able to run the lamps as long as they like; but the reports before us do not state what is to be the candle power of the lamps. Then the Barnes District Council are erecting some 150 workmen's cottages (certain of them are nearing completion), the rentals of which range from 5s. 6d. to 8s. 3d. per week, inclusive of the water and district rates. The cottages are intended to serve as a tributary to the revenue of the Electricity Department, on the principle that every little stream helps. They are wired for lighting; and the Electrical Engineer (Mr. C. S. Davidson), being a man of ideas in advance of the times, thinks that landlords should not only put in coal-ranges, but should supplement them by electric-cookers. Just so. The coal or gas range is very necessary in view of the unreliability of the electric-cooker. The landlords while about it might as well provide electric water-heating appliances, flat-irons, electric motor-cars, telephones, &c. However, what Mr. Davidson thinks, his Committee do not agree with; and so they want to make a charge that will cover all expenses in providing electric-cookers in the workmen's dwellings. They are of opinion that the scheme they have adopted will do this; we think it is a scheme that hoodwinks the councillors, and really carries out Mr. Davidson's ideas of a free equipment on the part of landlords.

The Scheme.

Mr. Davidson proposes an oven, 14 in. by 12 in. by 12 in., to accommodate a 4 lb. or 5 lb. joint, believing in his innocence that this will be sufficient for a workman and his family. Workmen and their families usually have good appetites; and they like a joint which can be cooked one day, and from which they can carve for the two or three succeeding days. Mr. Davidson puts down the cost of equipment, "including all wiring and fittings charges," at £4 per cottage. Seeing that the stove is estimated to cost about £3, this only leaves £1 for the wiring, fittings, and labour. Nothing is said as to the prepayment meter. We suppose that the meter manufacturers charge something for these intricate pieces of apparatus. It is calculated that the cost of upkeep for the cooker—nothing is said again about the prepayment electric meters, which, in our experience, are not very reliable—would be about 3s. per annum. Anyway, whatever is included or excluded, Mr. Davidson fancies a charge of 3s. 6d. per quarter would cover interest, redemption of capital, and maintenance of installation complete. It seems that the makers are only prepared to guarantee the cookers for one year; but Mr. Davidson calculates their life at eight years in arriving at the quarterly charge! He does not say whether he has calculated the prepayment meter on the same lines. Now the Electricity Committee have decided that a charge of ¾d. per unit will cover cost of the electricity delivered, capital, interest and maintenance costs of cooker and meter, installation and labour charges, bookkeeping, collection, &c., and provide a profit. This Electricity Committee ought at once to resign on the ground of an acknowledged incapacity. We should like to see the detailed computations that have been made to demonstrate this with the very intermittent use to which cookers will be put in the workmen's dwellings. Judging from Sir John Snell's address to the Institution of Electrical Engineers, and his report on the Southampton electricity undertaking, we think he would be prepared to prove that Mr. Davidson is altogether wrong in his fundamental considerations. A point of interest is that the Council's official adviser is of opinion that very little of this cooking load will come on during peak hours, and a large percentage of the total demand will obtain during the summer months. Any argument to prove a case! Our own experience is that gas-cookers in workmen's dwellings have good use made of them after the workman and the family have "left off" work for the day; and, during the winter months, this use of the cookers synchronizes with the peak lighting load. Perhaps Mr. Davidson will show how the ¾d. has been arrived at; we rather think he will decline. In the absence of the detailed data, we shall prefer to hold the opinion that the ¾d. covering so much as it has to do is not a defensible figure from either the commonsense point of view, or upon a case to which are applied those principles that are beloved by electricians, but rarely obeyed in the construction of tariffs.

The late Mr. James Carter, the Borough Treasurer of Preston, who died on the 2nd of January, left estate of the gross value of £15,112, with net personalty amounting to £2359.

There will be a meeting of the Midland Junior Gas Association in the City of Birmingham Technical School next Saturday afternoon, when Mr. R. G. Marsh, of Birmingham, will read a paper on "Compressing Installations."

EVENT AND COMMENT.

[**Communicated.**]

Determination of Benzol in Coal Gas.

On all coke-oven plants the gas is usually regarded as of comparatively little value, much more importance being attached to the efficient removal of bye-products. In recent years, benzol recovery has been a very profitable operation, and consequently producers are desirous of satisfying themselves that their extraction apparatus is doing its work thoroughly. In the case of tar and ammonia, simple tests are available by means of which it is possible to determine absolutely whether or not the apparatus employed is doing its work properly. Slight traces of tar and ammonia left in the gas are easily detected. With benzol, however, the case is different. In the writer's experience, there is no satisfactory test to determine the efficiency of benzol extraction plant. In the "Journal" for Feb. 23 (p. 450), some details were given of a method for the determination of the amount of benzol in gas, from a paper which had appeared in the "Journal für Gasbeleuchtung." It should be pointed out that the figures given in the article refer to German coals, and do not hold good for this country in the same way. For example, it is stated that "the heavy hydrocarbons in coke-oven gas do not total more than about 2·8 per cent." This is a very low figure; the writer having frequently found 4 and even 5 per cent. The writer has carried out a large number of determinations of benzol in gas with apparatus similar in principle to, but different in design from, that employed by Dr. Krieger. With rich gas—gas containing the usual amount of benzol—fairly consistent and approximately accurate results can be obtained. Considerably more gas than the quantity named by Dr. Krieger is, however, passed through. When it comes to testing the weak gas—*i.e.*, after the extraction of the benzol—the writer has not yet obtained satisfactory and consistent results, even when parallel tests were performed on the same gas at the same time. Assuming for the moment that there is a 90 per cent. extraction. This means that nine times as much gas must be passed when weak gas is being tested as is used with rich gas in order to obtain the same amount of benzol. Again, it has then to be assumed that the extraction in the test is absolute, and it is a very difficult matter to remove the last traces of benzol from the gas. Consequently, the writer hesitates in accepting the test as a reliable one for determining the efficiency of a benzol scrubbing plant. Messrs. Alex. Wright and Co. have recently brought out an automatic apparatus by means of which it is claimed that the efficiency of the benzol plant can be accurately determined. The writer is not aware of any instance where this apparatus has been employed for the purpose. A good and reliable test for determining benzol in weak gas will be welcomed by coke-oven people; and if such a test can be incorporated in an automatic apparatus or recorder, no coke-oven plant could afford to be without it.

The Manufacture of Toluol.

It comes as something of a surprise to find that the Government, through the High Explosives Committee, are paying special attention to gas-works just now with the object of augmenting the supplies of toluol by recovering it from town gas. Those in authority appear completely to have overlooked bye-product coke-ovens in this matter. Even to-day, when so much space is being devoted in technical journals to matters relating to bye-product coke-oven practice, quite a general impression exists that we obtain practically the whole of our benzol, toluol, &c., by means of the distillation of tar. One frequently finds this being stated also in these same technical journals by writers who are apparently totally ignorant, if not of the existence, at least of the importance and the standing of the bye-product coking industry. There are approximately 7500 bye-product ovens at work to-day in Great Britain; and of these probably at least 6500 are worked in conjunction with benzol recovery plants. Now the average bye-product oven will carbonize approximately 2000 tons of coal per annum; and reckoning a yield of 2 gallons of crude benzol per ton of coal carbonized—a fair average figure—we get as the approximate amount of benzol produced per annum $6500 \times 2000 \times 2 = 26{,}000{,}000$ gallons. The total amount of benzol obtained by the distillation of tar probably does not nearly amount to 10 per cent. of this quantity; so that the relative importance of the two sources of supply is evident. In the same way, a large amount of toluol is produced in coke-oven plants; and as far as the writer has been able to find out, the Government have—with few exceptions—apparently quite ignored bye-product ovens in their efforts to increase the supply of toluol. Is it that the Government have no representative on the Committee who is cognisant of the status of the bye-product coking industry? If so, it is time that the omission was remedied. On all coke-oven plants which produce crude benzol, a considerable amount of crude toluol could also be manufactured at very little extra expense. In most instances, this toluol has actually to be eliminated to some extent from the benzol, in order to allow the latter to meet the trade requirements of ordinary crude or 65 per cent. benzol.

The Labour Question in Bye-Product Coking.

In bye-product coking, as in most other spheres of industrial life, much difficulty is being experienced in obtaining sufficient

men to carry out the duties on the plant. Bye-product coking differs in one important respect from many industrial concerns, in the fact that while, with some of the latter, a restriction in the number of men available can easily be contended with by a corresponding reduction in output (maybe stopping certain sections altogether), with bye-product coking the conditions are found to be somewhat different. If the output is restricted, even by 50 per cent., the same operations are to be performed, though at a slower rate and a fewer number of times. The same machinery is required, most of it running continuously, just as if the plant was in full operation. With the sole exception perhaps of the coke loaders, there can therefore be no diminution in the number of men employed; and consequently with a restricted output, the operating costs per ton of coal carbonized are very considerably increased. The same, of course, applies to the production of the various products, tar, ammonia, and benzol. Since the commencement of the war, several new coke-oven plants have been put into operation, and managers have found it exceedingly difficult to obtain the necessary labour for working the plant. Twelve-hour shifts in some cases are being worked instead of eight, and even then many of the men frequently do double shifts. Again, too, many quite unsuitable men have had to be employed in positions which could otherwise not be filled at all—a course which is certainly not calculated to bring about efficient working. There is unfortunately no other alternative. The scarcity is not only confined to the workmen, but there is also great difficulty in obtaining foremen, and even managers. Colliery companies are recognizing now more than ever that it is the best policy to employ a manager who has had a scientific training, and who can appreciate to the full the importance and value of the chemical side of the work. Such men are not easy to get at the best of times, and just now they are exceedingly scarce. Good salaries are offered, so that there is some incentive for young and ambitious men. The great mistake that so many of our young men make is that they are too impatient—or is it too conceited?—and imagine that because they hold a diploma, or have attended a college course, they are fully qualified to take complete charge of a plant. These men are not wanted. A young man must be prepared to accept comparatively small remuneration until by actual experience he proves himself worthy of the larger consideration. Several other new plants are rapidly approaching completion, so that the difficulty of obtaining suitable men is likely to be accentuated rather than diminished. Many of the best positions have been frequently held by Germans, solely because suitably qualified Englishmen were not available. It is for us to see that this state of affairs does not recur after the war.

Mr. Lee's Yorkshire Address.

The presidential address of Mr. J. W. Lee before the Yorkshire Junior Gas Association, on the subject of the every-day working of a modern bye-product coking plant, shows very clearly the remarkable developments which have taken place in this industry in recent years. In this particular instance, it is quite conclusively proved that scientific control of a plant pays for itself over and over again, and that without it the channels of waste cannot very well be closed, for the simple reason that their whereabouts are not known. It is not on every plant that such full supervision and control are given to the chemical side of the work as is outlined by Mr. Lee; but the tendency is more and more for colliery people to develop in this direction. It is interesting to note that Mr. Lee refers to the unsatisfactory nature of the test for benzol in stripped gas, which is mentioned in a preceding paragraph. The facts and figures given by Mr. Lee in regard to the purification of coke-oven gas from sulphuretted hydrogen will no doubt be of great interest to coke-oven people who are considering the utilization of their surplus gas in gas-engines. It is a well-known fact that this method of using the gas is far more economical than burning it under boilers for steam-raising. Electric power is nowadays being largely used in place of steam or coke-oven plants. We have motor-driven exhausters, motor-driven pumps, and all coal and coke handling plant, charging and discharging machinery, &c., are usually operated electrically. Hence there is a large current consumption; and the gas-engine driven generator is a very efficient means of producing current. Mr. Lee's figure of 0·12d. per unit as the cost (excluding gas) is sufficiently low to make this form of prime mover an attractive one. The efficiency of the gas-engine has, of course, much to do with the economy of production; and it is characteristic of Mr. Lee's thoroughness that he attains high efficiency in the running of the gas-engine by controlling analyses of the exhaust gases.

British Association Meeting.—The Council of the British Association, in consultation with the local Executive Committee at Manchester, have decided that the annual meeting shall take place in that city in September next as arranged. Both the Committee and the Council have felt that it would be inexpedient, under present conditions, to offer the elaborate local hospitality, in the form of social and other arrangements, which has been extended to the Association on former occasions. The Committee, however, expressed their desire that the "long continuity of the yearly meetings should not be broken," and stated that it would "prefer that the meeting should be held, although restricted to its more purely scientific functions."

DISASTROUS EXPLOSION FROM A DEFECTIVE SERVICE GOVERNOR.

At the Sixty-First General Meeting of the Association of Gas and Water Engineers of Saxony-Thuringia, there was presented by Herr Reinhard, the Manager of the Leipzig gas undertaking, a short communication with reference to a disastrous gas explosion which occurred in Leipzig on the night of the 1st-2nd of February last year. The communication was published in the "Journal für Gasbeleuchtung" of Jan. 30, from which we take the following particulars.

The explosion occurred shortly after midnight in a spacious cellar of a bookseller's establishment and a basement restaurant adjoining it. The explosion and resultant fire were attended with loss of life. There were six gas-meters located in the cellar for supplies to various parts of the whole building—four being 50-light meters in an open cupboard, one of the remaining two being a 200-light, and the other a 5-light meter, both standing exposed on the floor of the cellar. On the outlet of the 50-light meter for the supply of the restaurant, there was a Hahn's governor having 1½-inch connections. This governor, which, as far as could be traced, had been installed more than nine years previously, was of the antiquated type shown in fig. 1. The later types of Hahn's governor are constructed according to fig. 2 of the above sketch.

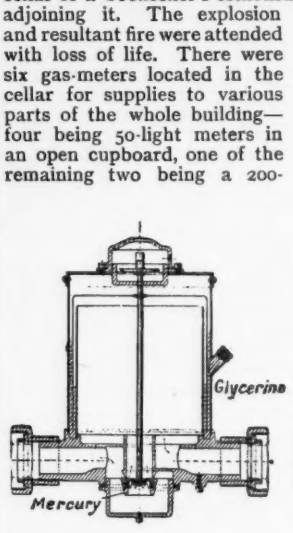


Fig. 1.

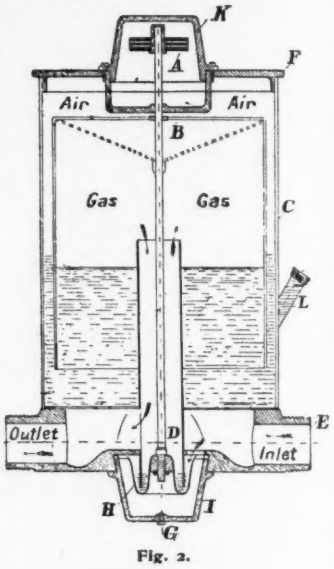


Fig. 2.

The old pattern contains considerably less glycerine to seal the bell; and so far as could be traced in this instance the glycerine had not been renewed, or the governor inspected, during the past nine years. Investigations on this governor made by Herr Reinhard after the explosion showed that nearly the whole of the glycerine had disappeared—presumably evaporated—and that there was also a deficiency of mercury. It is not known whether the governor was originally filled with neat glycerine or with glycerine and water. It is clear, however, that the gas on the night in question blew the seal of the governor and the explosive mixture of gas and air in the cellar, which had a cubic content of about 11,650 cubic feet, was ignited by a young cook who brought a naked flame into the cellar. The explosion was very violent, and caused widespread damage. In view of the disastrous results, Herr Reinhard has thought it useful to draw attention to the defective character of the governor and the way in which the defect has been minimized in the more recent type.

A British Industries Conference.

A joint meeting of the Cardiff Development and Technical Schools Committees has adopted the recommendations of a Sub-Committee on the subject of a conference on the extension of British trade, with special regard to the establishment of new industries at Cardiff. The Sub-Committee recommended that a two-days' conference be held, on April 20 and 21; and that after a general discussion on the whole question of the extension of British trade, papers should be read by Mr. T. G. Watts, B.Sc. (Chemist at the Great-Western Colliery), on "Coke-Oven Bye-Products," Mr. R. H. Greaves, M.Sc. (Cardiff University College), on "Ammonia and Its Compounds," Mr. W. J. A. Butterfield, M.A., on "Bye-Products of the Gas Industry," Mr. Russell Taylor (Chairman of the Incorporated Beet Sugar Pioneer Association) on the "Beet Industry," and Colonel C. S. Denniss (Cardiff Railway Company) on "Cardiff as an Importing, Exporting, and Distributing Centre." The offer of Professor Armstrong (head of the Chemical Department of the City of London Technical Schools) to read a paper was also accepted; and the Sub-Committee were asked to endeavour to secure the attendance of an expert on the aniline dye industry.

MANCHESTER JUNIOR GAS ASSOCIATION.

Visit to the Preston Gas Company's Works.

The members of the Manchester and District Junior Gas Association were originally invited by Mr. A. H. Smith, the Engineer and Manager of the Darwen Corporation Gas-Works, to pay him an official visit during the term of the 1914-15 session now drawing to a close, and to embrace the opportunity of inspecting the Munich chamber system of carbonization which has been installed there during the last few months. But owing to unforeseen circumstances arising out of the European War this was found to be impracticable. An old friend of the Manchester Junior Gas Association, however, stepped into the breach—the result being that at the invitation of Mr. Samuel Tagg, the Engineer of the Preston Gas Company, a visit was fixed up to the old and new works of the Company—about forty members making the journey thither last Saturday. The Manchester and Liverpool contingents were both well represented by ordinary members turning up in fair numbers; and the principal officials were also present. These included: Mr. J. M'Nicholl, of Warrington, the President; Mr. S. Carter, of Liverpool, the Junior Vice-President; several members of the Council; a few of the members of the Manchester Senior Association; and Mr. James Bridge, of Stretford, the Hon. Secretary. Others had previously intimated their regret at being unable to make the journey, owing to the war.

Welcomed at the Works.

The members were cordially welcomed at the works by Mr. Tagg, and by Mr. W. L. Heald, the Assistant-Engineer to the Preston Gas Company, and last year's President of the Manchester and District Junior Gas Association. They were escorted round the works in two parties led by Mr. Tagg and Mr. Heald. About two hours passed there all too quickly; the visitors—as was apparent from the large number of questions asked—exhibiting lively interest in, and appreciation of, everything done for their benefit. The attentions of the members were not solely confined to the new Glover-West installation of vertical retorts erected on the new works (although this feature occupied more than half the total time spent in the works); but the horizontal settings charged by the "F.A." and "D.B." machines received a fair amount of attention. It is not intended, at present, to publish an account of the Glover-West verticals, or of the new workshops and stores erected since the members last visited Preston; this may form a subsequent contribution when everything has been completed. It should be added that while the visitors were in the laboratory, Mr. Tagg showed them a new form of portable street photometer; a good deal of interest being displayed in this instrument by the members.

Tea at the Gas Offices.

A move was afterwards made to the handsome and commodious general offices (with stove show-rooms on the ground floor) of the Company, which are situate in Fishergate, the principal thoroughfare in the town. Tea was actually served in the gas appliance show-rooms—a handsome, lofty apartment, well equipped in its acoustic properties, as the President pointed out in a short speech after the repast.

This event over,

The President (on whose right was Mr. Tagg) formally explained the reason of the alteration in the visit to Preston instead of to Darwen. When they found themselves in the dilemma already explained, they wondered what they should do; but, on approaching Mr. Tagg, he, with his usual kindness to them, promptly made arrangements for them to visit Preston. As their President, he desired to tell Mr. Tagg how deeply indebted the Council and members of the Association were to him for his kindness. They were also greatly indebted to the Chairman of the Preston Gas Company for the kind hospitality he had extended to them, and which they had thoroughly enjoyed.

Mr. R. B. Braddock (Radcliffe) proposed that the members tender to Mr. Tagg a hearty vote of thanks for all the kindness he had extended to them that day. In the present strenuous times, it was no slight matter for an engineer to give up a Saturday afternoon in order to be of benefit to the Juniors. Referring to the visit to the two works, the speaker went on to say that the keynote everywhere appeared to be efficiency, and everything seemed to have been provided that was necessary in a large and important works for "carrying-on" in case of a sudden stoppage or breakdown. The best thanks of the visitors were certainly due to the Chairman and Directors of the Preston Gas Company for so kindly inviting the members to view their works that day.

Mr. A. L. Holton, one of the members of the Council of the Association, seconded the vote. The present was their third visit to "Proud Preston;" and he need hardly assure Mr. Tagg that they had very heartily looked forward to visiting his works again. He confessed he was beginning to see the advantages there were in visiting a town more than once, because after a lapse of a few years they were able to note what improvements had taken place. After a tribute to the services of the late Mr. Henry Green (a former Manager of the Preston Gas Company for many years), and the present modernizing methods of the present Engineer, Mr. Holton went on to remark that he trusted Mr. Tagg would be spared to them for a very long time, so that they might participate in even another visit to Preston to see and admire the bent of Mr. Tagg's further work. The results achieved at Preston certainly called for their admiration. They were especially indebted to Mr. Tagg for his many kindnesses to them all while going round the works. Wherever there was the slightest difficulty in the machinery, Mr. Tagg had told them plainly and distinctly about it. It certainly was not often in the course of a visit to a works that an engineer would be good enough to point out a possible fault, and openly direct attention to it. Might he (the speaker) recall Mr. Tagg's memory to his association with the Manchester Junior Gas Association when he was a younger man? He (the speaker) well remembered the time when Mr. Tagg read a paper that dealt very ably with the question of efficiency in gas-works. He felt he was voicing the sentiments of the members of the Association that day when he said that Mr. Tagg was certainly putting into practice what he then preached about efficiency.

Mr. Tagg (who was cordially applauded on rising to reply) said he was very much obliged to them for the vote of thanks; and in particular for the nice manner in which it had been moved, seconded, and received. He assured the members that he was always interested in Junior Gas Associations, because it was to the Juniors that the industry must look forward for important developments in the future. If the visit to the Preston works that day had afforded them any interest and pleasure, he was delighted. It was, he assured them, a pleasure to be able to do something towards the common good of the industry they were all proud to be associated with. He would have pleasure in conveying to the Chairman of the Company their thanks for his hospitality.

The "Tagg-Thorp" Flow Recorder.

While the tables were being arranged for the evening business proceedings, Mr. Tagg explained to the members the construction and working of the "Tagg-Thorp Flow Recorder for Station Governors."

The Paper Submitted.

Mr. W. Buckley, of Manchester, read a paper entitled "Deposits in Manufacturing and Distributing Systems," which, with some of the remarks made upon it, and the author's reply on the comments, will be found on p. 590.

Mr. W. Fletcher (Liverpool) proposed, and Mr. S. Carter (Liverpool) seconded, a hearty vote of thanks to Mr. Buckley for his paper—the proceedings at this stage having to be curtailed owing to the exigencies of the lessened railway service.

In the course of a brief reply, Mr. Buckley said he was sorry there was not longer time to pursue the discussion as the paper was bristling with controversial points. It was only the second paper he had ever read before the Manchester Junior Gas Association; but he was willing at any time to be of service to them if he could be. The subject-matter of the paper had, he thought, never been touched upon before.

SCOTTISH JUNIOR GAS ASSOCIATION.

(WESTERN DISTRICT.)

A Meeting of the Scottish Junior Gas Association (Western District) was held in the Royal Technical College, Glasgow, last Saturday—Mr. David Fulton, the Vice-President, presiding.

The Question of a Social Meeting.

The Chairman intimated that the Council had decided to put before the meeting the question of whether or not they should have a social meeting at the end of, or some time during, the session. He invited discussion on the subject, and

Mr. John Wilson (Falkirk) considered it would be a great pity if they let the session pass without a social meeting of some kind. He thought such meetings did more good than they were aware of.

Mr. Alex. Paterson (Street Mains Department, Glasgow) moved, as an amendment, that they should not have a social gathering.

Mr. Fulton explained that the holding of such a function would in no way show indifference to the European crisis.

Mr. John Frazer (Glasgow) thought that the annual social function was the backbone of the Association.

Mr. J. W. Carmichael (Barrhead), who explained that he had had a son at the Front during the last few months and had other two sons in training, considered the Association should put off the social meeting. He admitted, however, that it was with him altogether a personal question.

On a vote being taken, it proved in favour of a social function being held. This will probably take place at the annual general meeting, but will be simple rather than convivial in character.

Carbonization in Vertical Retorts.

As Mr. Fulton was contributing a paper, on the above subject, the chair was taken by

Mr. John Wilson (Falkirk), who remarked that as Mr. Fulton had been a long time now with the verticals in Helensburgh, he would, no doubt, be able to give them some good fare.

The paper, together with a report of the discussion to which it gave rise, appears on p. 594.

The Ilkley Urban District Council have agreed to supply gas to all the institutions under the control of the Ilkley Soldiers' Institute Committee, during the period of occupation by the 17th Service Battalion of the West Yorkshire Regiment (Leeds Pals), at the price of 1s. 6d. per 1000 cubic feet consumed above the average consumption of gas on the same premises during the corresponding period of the past three years. The Council have also decided to supply free gas to the premises of the Ilkley Soldiers' and Sailors' Needlework Guild.

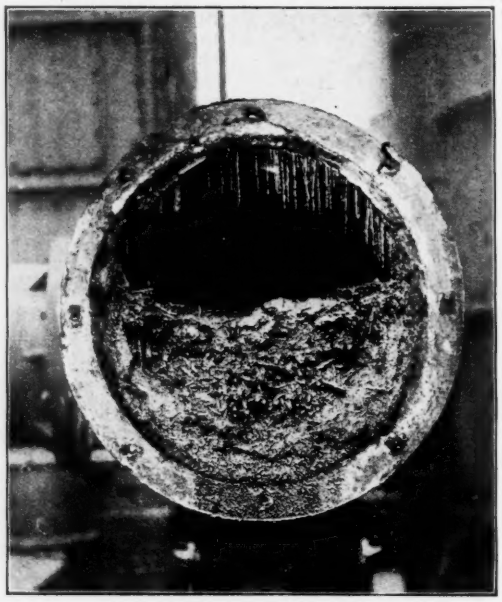
NOTES ON DEPOSITS TAKEN FROM THE MANUFACTURING AND DISTRIBUTION SYSTEMS.

By William Buckley, Rochdale Road Gas-Works, Manchester.

[A Paper read before the Manchester Junior Gas Association, March 6.]

With the exception of a paper entitled "Notes on the Corrosion of Service-Pipes," read by Mr. James M'Leod at the Glasgow meeting of the Institution of Gas Engineers, very little information has appeared in the Technical Press regarding the composition of deposits which from time to time make their appearance in the hydraulic and foul mains, also in the mains and services of the distribution system. These deposits are at times a source of considerable trouble and annoyance to those engaged in the manufacture and distribution of coal gas.

It does not follow, however, because of this lack of information that the matter has not been the subject of investigation; but, as I will show later, the appearance of certain deposits may reflect somewhat on the management at the works, and in such a case one can hardly blame those in authority for suppressing the information. Unfortunately these deposits have not received the attention they deserve; the foreman or inspector concerned simply dismissing the matter with the remark "I suppose it is 'salts' again." For a number of years I have been interested in this subject; and through my connection with the Manchester School of Technology have at various times had submitted, by the students and others, some curious and interesting examples of what can be deposited in the mains and services.



A Deposit of Ammonium Chloride.

I will first of all deal with deposits taken from the mains, &c., in the works, with special reference to the effect ammonium chloride appears to have on the behaviour of these deposits. My first experience of a considerable deposit in a foul main, and one which I now look upon as being most interesting and instructive, occurred when a blank flange was removed from a main, which, owing to its position, was practically a dead-end at the inlet to a Livesey washer, no gas passing through this section of main. The point at which the photograph was taken would be about 10 feet from the inlet to the washer. On subjecting the deposit to examination, it was found to consist mainly of ammonium chloride, together with some sulphide and carbonate; also a little tarry matter and naphthalene.

It will be noticed from the illustration that suspended from the top of the main is a mass of material very much resembling stalactites. These were almost pure ammonium chloride. From time to time they had become detached, and, falling in the bottom of the main, gradually accumulated into the mass shown, and which has embedded in it a large number of these pencils. The presence of 81·6 per cent. of ammonium chloride in this material was quite a surprise; but I am afraid that at the time I had not had sufficient experience to realize the importance of the discovery. I mention this incident, because in September, 1910, ammonium chloride in deposits again forced itself upon my notice, but under somewhat different conditions.

Of recent years the question of deposits in ascension or take-off pipes, collecting and foul mains, has received considerable attention, especially from those engineers who have adopted vertical retorts, because all the systems, whether intermittent or continuous, have had trouble in this direction. When we read of mechanical agitators being introduced into collecting mains, to assist in preventing the accumulation of thick tar and pitch, trays to catch this pitch, and foul mains so arranged that the tar and liquor deposited run back into the collecting main, and by their presence assist in keeping the tar deposited therein in a fluid condition, it does not require the acumen of a Sherlock Holmes to recognize that considerable trouble has occurred, and no doubt the cost of attention has been by no means negligible.

Mention has already been made to the presence of ammonium chloride in a deposit taken from a foul main; and as this material nearly always appears in deposits which occur in the retort-house and apparently has some influence on the behaviour of the tar in collecting and foul mains, more particularly when working with a dry main, a few remarks on this matter may be of interest.

Soon after the vertical retort installation was put into operation at the Droylsden works, instructions were given to examine the tar produced, and make special note of the quantity of solid carbon (so-called) which it contained. The plant was being worked with a dry main. The chief source of trouble was due to the accumulation of thick tar in the collecting and foul mains, and it was at first thought that this trouble was due to the high temperature of the gas entering the collecting main.

It was, of course, common knowledge, from reports published of analyses of tar from the Woodall-Duckham installation at Bournemouth, that the carbon content was low; so I was rather surprised to find 14 per cent. in a sample of tar taken from a syphon-pot at the end of the condensing system. The extraction had been carried out in the usual manner, and there was certainly nothing left in the residue which was soluble in either benzol or carbon bisulphide. On treating this residue with water, however, it was found that quite a large quantity dissolved. As a matter of fact, 74 per cent. was soluble and consisted of ammonium chloride; so that instead of the carbon being 14 per cent. it was only 3·64 per cent.

After this experience it was decided to examine deposits from various portions of the plant. The results observed gave us rather a shock, but at the same time were of so instructive a character that we were enabled to suggest and apply a remedy for this pitching-up, &c. It was quite successful; and at the present time no trouble in this direction is experienced either at Droylsden or on the 4 million installation at Rochdale Road.

From that time to the present I have examined a large number of deposits taken not only from vertical, but also from horizontal, installations; and the following tabulated results have been selected to give some idea of the composition of these deposits, as well as to demonstrate some of the points to which I wish to draw your attention. I have brought for your inspection a number of the samples, and, to further illustrate the composition, have separated 6 grammes of No. 8 into its component parts—viz., tarry matter non-volatile at 100° C., carbonaceous matter, ash, and ammonium chloride, some of which shows very distinctly the arborescent or fern-like crystals typical of this salt.

On looking through the table, it will be noticed that, with the exception of four samples taken at the mouthpiece end of the ascension pipes, chloride (I refer to ammonium chloride as chloride) is always present in greater or less quantities, and varies from 65·74 per cent. in a sample taken from the retort-house governor to 2·37 per cent. in the tarry mass deposited in a take-off pipe. There is little doubt in my mind that, quite apart from any chemical action this material may have on the plant, its presence in the collecting and foul mains has a mechanical effect by no means negligible. From the experience gained while carrying out a long series of tests on the vertical plant at our Droylsden works, and also from the analysis of a large number of these deposits taken under known conditions, I would venture to suggest that the presence of this material has been in a large measure responsible for the failure of some of the systems of dry mains which have from time to time been introduced.

My personal experience of dry mains has been limited, and what little I have had has been unpleasant. I am given to understand, however, that the most successful types of dry mains are those which are wet—*i.e.*, the hydraulic or collecting main always contains liquor; the dip pipes only being sealed during the period occupied by drawing and charging the retorts. For example, such as the Helps, Cort, or Tooley main, one of which we have in No. 1 Retort-House at the Rochdale Road works. This main has just been opened after nearly four years' working, and is in excellent condition; there being practically no deposit present.

In support of this I wish to draw your attention to Nos. 10, 11, 13, and 14, all of which were taken from the plant at Droylsden. At the time Nos. 10 and 13 were taken, we were using a dry main (already mentioned); no liquid being present except the tar and liquor deposited from the gas. Pitching-up in the collecting main gave a certain amount of trouble; and the governor was being constantly put out of gear by the deposit of masses of what were termed salts. Examination of these deposits revealed the presence of large quantities of chloride; No. 10 containing 38·72 per cent. and No. 13 65·74 per cent. It was suggested that this material, acting as a binding agent, prevented the tar from running away into the syphon-pot; and as the temperature of the gas was high and the bottom of the collecting main subject to a certain amount of radiant heat from the setting, the result was the production of a troublesome pitchy deposit in this main. At the same time quantities of the so-called "salts" crystallized at the inlet of the retort-house governor; and this mixed with a little tarry matter

Composition of Deposits Taken in the Retort-House.

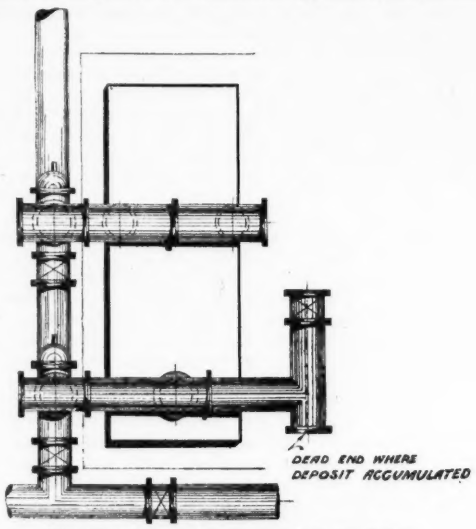
—	Take-off Pipes.			Ascension and Bridge Pipes.									Collecting and Foul Mains.						Retort-House Governor.	
	1	2	3	4			5		6				7	8	9		10	11	12	13	14
				Sooty Deposit near Mouthpiece. A.	Pitchy Deposit near Mouthpiece. B	Bridge Pipe. C.	Deposit near Mouthpiece. A.	Bridge Pipe. B.	Sooty Deposit near Mouthpiece. A.	Tarry Deposit Bridge Pipe. B.	Sooty Deposit Bridge Pipe. C.		Foul Main.	Foul Main.	Rough Portion of Deposit. A.	Smooth Portion of Deposit. B.					
Volatile at 100° C.	2·48	4·13	1·57	0·26	0·28	1 89	1·08	3·68	0·19	9·64	2·30		11·06	10·27	0·04	0·57	8·67	10·83	0·99	11·12	9·32
Soluble in C_6H_6	50·28	25·80	31·14	2·59	7·32	67·14	0·68	46·44	1·27	49·24	51·31		42·91	47·05	54·06	48·99	45·87	76·34	49·17	12·40	79·63
Carbonaceous matter.	25·83	66·30	49·73	95·83	92·31	21·49	95·57	26·89	98·26	31·95	37·26		14·12	13·19	31·77	39·42	14·41	10 47	43·62	9·86	7·86
Ammonium chloride	20·95	3·76	16·26	Trace	Trace	6·04	Trace	8·45	Trace	8·84	8·56		31·41	29·11	13·26	10·78	38·72	2·37	6·05	65·74	2·18
Ash	0·38	0·24	0·16	1·37	0·06	2·73	2·62	13·96	0·25	0·19	0·008		0·28	0·31	0·50	0·25	0·29	0·24	0·24	0·31	0·17

was a source of trouble. The dry main was replaced by one of the "dry-wet" type, and in addition ammoniacal liquor was pumped through the main.

Samples 11 and 14 were taken some little time after the alteration had been made, and when we were having practically no trouble with deposits of this character. It will be observed that the chloride is very much reduced in quantity; No. 11 having 2·37 per cent. and No. 14 2·18 per cent. These difficulties occurred quite early in the life of the plant. As a matter of fact, samples Nos. 10 and 13 were taken in October, 1910.

Nos. 7 and 8 also I think afford evidence which will support this theory. They were taken from the foul main just after the retort-house governor in two works many miles apart and using entirely different coals. While hot the deposits are fairly fluid; but on cooling they become viscous, and naturally cause trouble. The material is rough in appearance—an almost sure indication of the presence of chlorides; and on rubbing between the thumb and finger one can feel the gritty crystals of chloride which are present. As you can see from the sample on the table the carbon occurs as a fine powder. You could not at the present time obtain a similar sample from either of these works.

To mention other instances which have come under my notice where on pumping liquor through the collecting main deposits therein have been considerably reduced, is only to confirm those already noted; and if this is true of vertical plants, it is but reasonable to suggest that the material apparently responsible for



Plan showing the Arrangement of the Mains.

these deposits may also have been the cause of pitching-up of dry mains attached to horizontal installations. The action of the liquor is simply to keep the chloride in solution, and by preventing the deposition of crystals the tar is free to run away through the pipe provided for the purpose.

No. 5 is a rather interesting sample. A represents the deposit from the mouthpiece end of the ascension-pipe. This material was more coke-like than usual; and at first I thought that there had been an error in taking the sample. The low ash, however, disposes of this. B represents the deposit taken from the bridge pipe. As can be seen, it is semi-solid; and when cutting off small pieces for the purpose of analysis it felt quite gritty. The ash is extremely high—much higher, in fact, than any other sample examined.

This high ash requires some explanation; and although I have not had the pleasure of visiting the plant, perhaps we might be able to suggest a cause for this unusual occurrence. The retorts are charged by a machine of the pusher-charger type, and the sample was taken from the bridge-pipe at the charging end. It seems to me that the pull on the hydraulic main is excessive, and the vacuum produced would tend during charging to draw up the ascension-pipe some of the fine coal dust, which becoming embedded in the tarry matter would perhaps account for this high ash. This suggestion is more or less confirmed by my having taken on a number of occasions samples of gas in a district supplied from this works. Analysis shows the non-combustibles to vary from 17·76 per cent. to 19·97 per cent.

No. 6 B is another sample worthy of notice, because after extracting the tarry matter the crystals of chloride were so large they could readily be seen embedded in the carbonaceous residue. It is the only sample examined in which these large crystals have appeared, and was thought to be of sufficient interest to record by means of a photo-micrograph. This photograph shows the material enlarged about four diameters.

Crystals of Ammonium Chloride embedded in Carbonaceous Residue × Four Diameters.

If we again refer to the table it will be observed that in samples 1 to 6 the chloride varies from a trace to 20·95 per cent. Why is this? Carbon as you all know has the property in certain of its forms—*e.g.*, coke, charcoal, &c.—of absorbing, or as it is called occluding, large quantities of gases; hence its use in the form of charcoal as a disinfectant, and as a fertilizer in the form of soot. Ammonium chloride readily decomposes at a low temperature; and this may account for the absence of this compound in samples 4A, 5A, and 6A. But why it should be absent from 4B, which is tarry, and present in large quantities in Nos. 1 and 3, requires some explanation. In each of these cases the temperature would perhaps be about the same. If there was any difference it would be against the deposition of chloride in Nos. 1 and 3. It is a difficult matter to determine accurately the temperature of the gas leaving the retort, on account of the presence of tarry matter which deposits rapidly on the bulb of the thermometer. But it is not an uncommon occurrence to have a temperature of 200° Fahr. in the collecting main of vertical retorts; while you seldom reach 150° Fahr. in such a main attached to horizontals. Is it because more ammonium chloride is produced in verticals? Against this we have No. 2, taken from a vertical plant, with only 3·76 per cent., and 6B taken from a horizontal installation yet containing 8·84 per cent. Baker has shown that moisture plays an important part in the behaviour of this compound, and perhaps the presence of greater or lesser quantities of moisture in the gas leaving the retorts may be the factor which determines the quantity that is deposited in the take-off and bridge pipes.

At some future date we may be enlightened on this subject;

and I for one will be only too pleased to hear that some chemist has been given the time and opportunity to work out this problem. Works chemists rarely have the time to carry out such an investigation. My interest in the subject has been from the practical point of view—*i.e.*, trouble had occurred in certain portions of the plant through the accumulation of deposits. Instead of just simply reporting that the mains were pitched-up, cleaning out, and again starting—feeling quite sure that you would at an early date have to repeat the process—the deposits were carefully examined; the result being the application of a simple remedy which so far has been very successful.

Before leaving this subject it may be of interest to mention that from the thirteenth to the middle of the seventeenth century almost the whole of the ammonium chloride used in the arts and manufactures in Europe was obtained from Egypt. In 1770, Lemere, the French Consul at Cairo, sent the first account of its preparation, in which he says it is obtained by distilling in glass bottles, the outside of which was covered with loam to enable them to better withstand the heat, soot deposited from camel dung fires. The charge was 40 lbs., and the distillation took about three days. The chloride collected in the wide necks of the bottles which were exposed to the air. When distillation was complete, the bottles were broken and the cake extracted, being exported in this form.

The next sample is quite blue in colour, and was taken from the drum of a station meter. On testing, the meter was found to be slow. The roof was removed in readiness for repair, and an examination showed that the greatest perforation of the drum occurred at the points where the deposit was present in quantity. Cyanogen passing along with the gas has evidently reacted with the oxide of iron first produced, and a ferrocyanide is formed. I have estimated this as prussian blue, of which there is 8·46 per cent. present.

Mr. Thorp once sent me a sample taken from a rotary meter fixed at the outlet of the condenser on a carburetted water-gas plant. It was a gelatinous tarry mass, and examination showed it to consist of 91·2 per cent. of tarry matter and 8·78 per cent. of residue in the form of a perfectly white powder. This white powder contained 89·27 per cent. of silica. When we consider that before reaching the meter the gas would have to pass through the washer, scrubber, and condenser, one would hardly expect to find such a powder at the point at which it was deposited.

The Syphon Pipe, showing the Distortion, &c.

Mr. M'Leod, in his paper at Glasgow, mentioned a rather curious deposit, consisting of lead carbonate, taken from a compo pipe between the meter and cooker. On the table there is an example of such a deposit. This piece of pipe was the syphon attached to the inlet of a dry meter; and I understand that in the same district a number of such examples were taken out. When brought to me it was tightly packed with a greyish powder. The action has proceeded to such an extent that the pipe is distorted, the pressure of the accumulation causing it to bulge, and finally split. From the appearance, one would come to the conclusion that the action had commenced at the bottom, because here the greatest amount of distortion has taken place, and, in addition, almost the whole of the metal has been destroyed. What is the cause of this deposit? It must have been due to some constituent or constituents of the gas acting upon the metal.

Lead is unacted upon by pure water if no air is present; but if air is present a lead hydroxide is formed, which is slightly soluble in water. Should carbonic acid come into contact with this solution a basic carbonate, having the composition $2PbCO_3$, $Pb(OH)_2$, is formed. The action of water upon lead is accelerated by the presence of ammoniacal salts. What I suggest is that the gas sent into the district from which this pipe was taken contained an excessive quantity of oxygen, carbonic acid, and ammonia; and as water is always present and would condense in the syphon, the reaction once commenced would go on with the result shown.

I will conclude with the analyses of two deposits taken from flue pipes. In each case the pipe was practically made-up with the material, and, needless to say, "bad gas" was given as being the cause.

No. 1.—Flue-Pipe from Gas-Fire.

Moisture	0·61	
Organic matter	10·90	The tinned iron pipe was practically destroyed.
Oxide of iron	86·40	
Ash	2·05	

No. 2.—Flue-Pipe from Gas-Cooker.

Fats (soluble)	17·90	
Carbonaceous matter—		This sample was taken immediately behind the cooker.
Burnt fat, &c.	70·63	
Oxide of iron	9·98	
Ash	1·43	

My object in writing this paper will have been achieved if it leads to a good discussion. Many of the deductions are no doubt open to criticism, and perhaps some of the members may be able, from the experience they have had, to supply information which will be both instructive and useful. It is for you to analyze the subject-matter of the paper as I have done the deposits.

DISCUSSION.

The President (Mr. J. M'Nicholl, of Warrington) said that the members had listened to a most interesting paper. If there was any fault to find with it, it was that there was not enough of it. He hoped a good discussion would ensue, and he had great pleasure in calling upon Mr. Tagg to open it.

Mr. S. Tagg (Preston) said he thought the members should first compliment Mr. Buckley on having taken up a matter of so great an interest as deposits in manufacturing and distributing systems. No doubt an investigation or analysis threw light on the formation of these deposits. When he (the speaker) first read the paper, he formed the impression that the deposits were of extraneous growth, and something that ought not to be present; but, properly considered, perhaps the deposits had, through faulty designing or working of plant, failed to take the course they should have done. The tar and liquor condensed in the mains should find their way into the well; but if there were stoppages, they would not have achieved the object for which they originally set out. Viewed in this character, Mr. Buckley's paper gave perhaps a wider meaning than one gathered from a first impression of it. For instance, the stoppages in the ascension-pipes were deposits largely composed of free carbon and so forth—all kinds of stoppages which they wished to avoid. Pitching-up in the hydraulic main was due to the tar not being sufficiently fluid to flow away. Taking the wider view of the paper, then, they could find much more material for discussion than would at first appear. He would give another example. Though so many works might not have had stoppages due to ammonium chloride, everyone had had experience of stopped pipes and thick tar, of naphthalene troubles, and similar sources of annoyance. In the manufacture of carburetted water gas, there was the trouble of the elimination of the tar vapours before the gas entered the purifiers. This was the reverse of the subject treated by Mr. Buckley, in whose case it was the absence of the deposits. He mentioned this in the hope that it might offer the members some subject for discussion. With reference to the author's criticism of dry mains, he (the speaker) must say that he had not had any experience with mains which were presumed to be totally dry—*i.e.*, mains in which the whole of the tar and liquor was removed directly they were condensed. His experience, fortunately, had been the reverse of that of the author. Certainly at Cheltenham—which works still ranked as an object-lesson in carbonizing—there were dry mains and butterfly valves. The results obtained were, and are now, satisfactory; but in the bottom of the main there was always a certain amount of condensation. The arrangement had worked well, and better since they flushed water-gas tar through the mains. [At this stage Mr. Tagg explained, by means of a blue print, the system of hydraulic mains in use at Preston.] After the first reading of the paper, he had looked eagerly, but in vain, for a remedy for preventing the stoppages mentioned by Mr. Buckley. In the early part of his paper he referred to it, and he (the speaker) thought the author would be able to satisfy the curiosity of a large number of members if he would state the remedy he applied. He (Mr. Tagg) supposed that it was something in the nature of a solvent. Mr. Buckley suggested that the presence of ammonium chloride acted as a binding agent, and prevented the tar from running away. He (Mr. Tagg) said the temperature of the ascension-pipes was higher than the subliming temperature of ammonium chloride; and therefore he would not expect to find there a deposit of this substance. With reference to the presence of silica in the sample of the tarry matters extracted from the rotary meter, he did not think this was a matter for surprise. In a water-gas plant, the condenser was fixed very close to it; and it was quite conceivable that fine particles of ash were carried out with the gas. He should certainly expect to find some fine particles of coke dust carried into the superheater. This might cause disintegration of the chequer brickwork, and the particles would be carried forward, thus explaining the presence of 89 per cent.

of silica in the rotary meter. He (Mr. Tagg) suggested that, in connection with the paper, it was still open for anyone to adduce further reasons in respect of the matter on which he had spoken. The question of the deposit of lead carbonate, taken from a compo. pipe between the meter and the cooker, mentioned near the end of the paper, was a very interesting one, because it touched the distribution side. To his (Mr. Tagg's) mind, the inclusion of this feature was a very happy one. With regard to the deposits on gas appliances, the subject was interesting not only to the members as gas engineers, but also to the layman. One such individual told him he did not like inverted incandescent burners because of the deposit or discoloration on the fittings, which was not the case with upright burners. There was also very considerable deposit on the underside of a cast-iron boiler heated by a luminous flame. It was not oxide of iron, because the powder was white. In conclusion, he thought the paper was one that lent itself to considerable discussion; and the author was entitled to congratulation on having adopted an unusual line of investigation by going into the character of the deposits taken from manufacturing and distributing systems, and presenting the paper in so concise a form.

Mr. A. L. Holton (Manchester) said he should personally like to have seen the paper divided a little more into various parts of the manufacturing and distributing systems. Mr. Buckley had dealt largely with the hydraulic main; and, like the previous speaker, he (Mr. Holton) was not at all convinced that all the trouble was due to ammonium chloride. He had had similar experience to Mr. Tagg through having used water-gas tar in the hydraulic main. This did undoubtedly clear away sediments. The members of the Association had visited one works where it was the practice to pump tar through the hydraulic main, and the result had been very good. Mr. Buckley had mentioned a matter which Mr. Tagg had taken up—viz., the dust carried forward in the water-gas plant. He (the speaker) thought he was right in saying that with water-gas tar one of the main difficulties in separation was due to the fine particles of dust present. If the tar was pumped through a filter-press, the dust would be got rid of, and he thought the water and tar would then soon separate. He was rather surprised to hear what the author had to say in respect of the lead carbonate deposits, and as to the complaint of "bad gas." The figures clearly showed remarkable results in regard to the oxide of iron deposits, for in case No. 1 quoted in the paper (the flue-pipe from a gas-fire), the particular deposit amounted to 86·40, and in case No. 2 (the flue-pipe from a gas-cooker) it was 9·98.

Mr. F. B. Small (Liverpool) asked the age of the lead pipe, as he thought the time the pipe had been in use had much to do with it.

Mr. S. Carter (Garston) said Mr. Tagg had to some extent forestalled him, because he (the speaker) had intended offering some remarks on certain of the points dealt with by Mr. Tagg. He questioned the high percentage of ash in Table 5 B., and also spoke at some length on the deposit taken from the rotary meter respecting the percentage of silica. He wondered if it really was silica. In the case of deposits in the lead pipes, this point also was very interesting. He thought the reaction which took place might be when the pipes were filled with air, not gas—say, when the house was untenanted.

Mr. W. L. Heald (Preston) said he should like to be allowed to add a few words to what Mr. Tagg had said about water-gas tar in the hydraulic mains. They found there was considerable trouble, and Mr. Tagg had carburetted water gas put in. From that they received great help. With the main from the tar-tower to the well they had a lot of trouble until November last year; but by flushing it with water-gas tar from which the water had not separated, they got rid of their trouble. There was a gritty substance in the tar in hydraulic mains which he thought was soluble. Water-gas tar did not dissolve ammonium chloride; but if the tar emulsion was used, the water would dissolve the chloride. Since the vertical retorts had been installed, the condensed products (consisting chiefly of water) had been used, and they had found that this had kept them free from stoppages in the main from the tar-tower. After the visit to Blackpool he was firmly convinced that it was of very great benefit to pump tar through the hydraulic mains.

Mr. Holton asked a further question about the Livesey washer. He wished to know whether the blank-end had not been cleared for a long time. If the accumulation had been collecting for seven or eight years. he could quite understand the crustation forming.

The President heartily wished there had been more time to carry on the discussion, as it had proved very interesting so far as it had gone. He thought it would be instructive to know how the ammonium chloride travelled so far as the Livesey washer. There was another matter he ventured to criticize—it had already been done by Mr. Tagg and Mr. Carter. It referred to the presence of ash (13·96) in Table 5 B. In the table the amount dissolved-out by C_6H_6 was 46·47 per cent. This was very high. It disposed of the idea that it was coal dust, as undoubtedly a great proportion was tar. He suggested that perhaps it was fire-clay lutings.

Mr. Buckley, in reply, said that to deal with all the questions would take a long time. The figures given for ash in Table 5 B (13·96) had been mentioned by several of his critics. It was not fire-clay lutings—that was very certain. The President had remarked that the soluble matter was 46·44. He (Mr. Buckley) granted this. The deposit, however, had been accumulating for some little time. The tarry matter would run away, but the deposit had become embedded. He thought it was due to over-pulling. He had analyzed the gas supplied from the works, and had found 20 per cent. of non-combustibles. This was extremely high, when the usual amount should be something like 6 or 7 per cent. Mr. Tagg had mentioned the pitching-up of dry mains, and the non-pitching-up at Cheltenham. Of course, they all knew how particularly fortunate they were there, or they knew their plant so well that they could deal with it and eliminate troubles. It might possibly be they had some system of simple flushing or simple water trickling in the main. With regard to the remedy, which was asked for by Mr. Tagg, he (Mr. Buckley) thought he had given it in the paper. He said that a main of the wet-dry type was introduced, and in addition ammoniacal liquor was pumped through the main. In the case where the deposits were taken from the retort-house governor, they tried to steam the governor; but the steam would only reach certain portions of the ammonium chloride. The tar had settled on the deposited chloride, thus protecting it from the steam. In discussing the question of ammonium chloride in the carbon, Mr. Tagg mentioned a point upon which he (the speaker) would be very pleased to receive any information. The analysis went to prove that, up to a certain temperature, ammonium chloride was present. Some of the carbonaceous matter taken from the bridge-pipe was like hard soot; but where the soot had softened and mixed with the tar, there was ammonium chloride in the deposit. A sooty deposit taken from the mouthpiece end of the ascension-pipe did not contain ammonium chloride. [See Tables 6A and 6B.] He thought at one time perhaps vertical retorts produced more ammonium chloride, but the tests did not prove this to be so. Of course, Mr. Tagg was aware that the cause of the discoloration of the burner fittings was copper sulphate; and the deposit on the boiler was ferrous sulphate. He would get the coloration if some of the powder was dissolved in water. Replying to Mr. Holton, Mr. Buckley said no doubt it was quite possible to have in hydraulic mains deposits which were not the result of ammonium chloride. It might, however, be that the hydraulic main was nearer to the retort-stack, and the temperature would be very high. The temperature of carbonization might also have an effect; and no doubt there were other conditions to be considered. With regard to the particles of dust in water-gas tar, he had very little to do with that. He had simply introduced the question from a chemist's point of view. Regarding the deposit taken from the rotary meter, containing 89 per cent. of silica, he agreed with Mr. Tagg, and thought it was from the disintegration of the chequer brick-work in the superheater. With respect to the dead-end of the main, near the inlet of the washer, this had not been cleaned out for a long time.

GAS PROGRESS IN TURIN.

Notwithstanding the cost of coal and the outbreak of war, we learn from the last annual report of the Gas Consumers' Company of Turin, Italy ("Società Anonima dei Consumatori di Gas-Luce"), that gas affairs in this important city are not only satisfactory but progressive. During the twelve months covered by the report, 21,750,465 cubic metres of gas were sold, which was an increase of over 500,000 cubic metres on the sales of the previous year. Gas-meters, likewise, have gone up in number—from 45,000 to 47,000. In spite of keen electricity competition, the Board of Directors are convinced the future offers splendid prospects—especially in respect of the use of gas for heating purposes.

Early in 1913 the price of coal was 24s., c.i.f. at Savona. Later it rose to 25s. 6d.; while during 1914, it dropped first to 22s. 6d., then to 20s. 9d. The Company were fortunate enough, at the outbreak of war, to have their coal-stores well stocked—even considerably above their contractual obligations with the Municipality of Turin. All the coke is readily sold; so much so that efforts are being made to use in the producers coke dust mixed with tar, and coke dust briquettes made on the gas-works. Old scrubbbers have been replaced by modern vertical centrifugal washing apparatus, and old benches of retorts have given place to new.

The all-round satisfactory position, it may be remarked in conclusion, is largely due to the efforts of the Engineer and Manager, Signor Cav. Giacomo Beria.

Industrial Gas.

As an enclosure in the "Co-Partnership Journal of the South Metropolitan Gas Company" for March there is a two-sided bill, addressed to all users of power—pointing out that, in their district, 1d. can now buy sufficient gas to maintain a working load of 3 B.H.P. for an hour, and adding: "At our special rate, it is now possible to generate electricity, if desired, at a lower rate than that at which it can usually be purchased from the electricity supply company. If you would discuss the question of cheap power, an expert representative is at your service at any time you care to name." The back of the leaflet says: "We are now offering a discount off the price of gas used in any process of manufacture requiring the utilization of heat. We are prepared to make a special study of any problem, and to prove the success of our suggestions before advocating their adoption. We have an offer which is well worth the consideration of all those who desire to reduce their production costs."

CARBONIZATION IN VERTICAL RETORTS.

By David Fulton, of Helensburgh.

[A Paper read before the Scottish Junior Gas Association, Western District, March 6.]

The title chosen for my paper is somewhat more comprehensive than the subject-matter merits; for my main purpose is to put before you some particulars of our 3¾ years' experience with the installation of Glover-West continuous vertical retorts at Helensburgh, along with a few conclusions drawn therefrom.

The plant has already been fully described by my chief, Mr. Blair, in papers read to the North British Association of Gas Managers; and therefore, beyond reminding the members that the installation comprises sixteen retorts with a nominal capacity of 500,000 cubic feet per day, I shall not weary you with any detailed description of its design, except what becomes necessary to illustrate the points raised. The plant was started to work on July 6, 1911, and since that date no other form of carbonizing plant has been used in the works.

Coals.

The suitability of continuous vertical retorts for carbonizing the various classes of Scotch coal is a question of great importance; and so I may begin with a few remarks on this point. We have carbonized all classes of coal belonging to the West of Scotland, and several from the Eastern coal-fields, and have found that whatever class of coal is used, from the point of even working, it should be regular in size, and free from any large amount of gum.

With coals containing much gum (say those of the unscreened soft-coking variety), the tendency is for the fine gum to fall into the centre and form the core, the round coal remaining on the outer sides. Thus the core is correspondingly more difficult to carbonize, as the heat takes longer to penetrate it, and the speed of extraction must be reduced, or unburnt coals are brought down. It would almost seem in some cases that, with the coals at the sides coking, the core slips and falls down unburnt. The necessity of reducing the speed of carbonization affects the quantity of gas produced per retort, and also the quality of the gas. Ordinary screened coking coals, though a percentage of gum is made by the breaking, work excellently; the coke produced being of good size and fine appearance.

All forms of splint coal are readily carbonized, though the coke is somewhat smaller, and there is a larger percentage of fine breeze, caused by the continuous movement in the retort and the sheering action of the worm. All forms of nuts, from pearls to trebles, give very uniform working—in fact ideal working—and make excellent coke.

There is no trouble in carbonizing any particular class of coal. It is frequent changes in the retorts from one class of coal to another of different characteristics that give trouble, necessitating alterations in the speed of carbonization. Therefore it would be good policy to section the coal-bunkers so that the same class of coals might be kept as far as possible to the same retorts. Very uniform working would thus be obtained, as the rate of working would be practically constant.

Heating of Settings.

The method of heating the Glover-West vertical retorts is now fairly well known; but perhaps the following brief description may not be thought unnecessary.

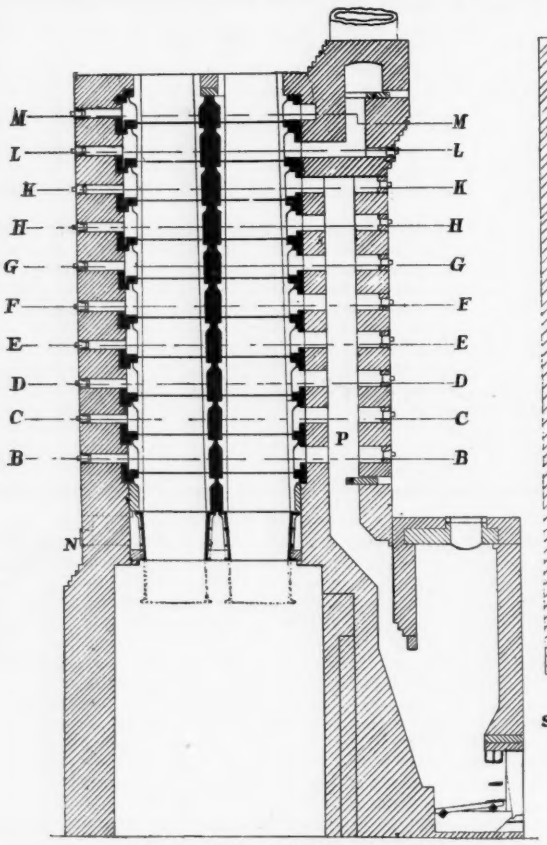
The retorts are 21 feet long, divided into eleven sections—as shown in sectional elevation. In the length of retort there are eight combustion chambers, each separated from the other. The two top chambers are heated by waste gas from these combustion chambers, and the bottom fire-clay section is merely a cooling-chamber.

From the producer the fuel gas ascends the vertical duct P, a damper regulating the quantity. A proportion of the fuel gas is drawn off into each chamber by the pull of the chimney; the quantity admitted being controlled by the damper R—as shown in the sectional plan. The secondary air enters at the bottom N from the opposite side, and circulates round the bottom cast-iron section; so being heated and cooling coke (a noteworthy feature), ascending the vertical duct S (sectional plan), past the damper T, through the passage W to the side of the retort, where combustion takes place. The gases pass round the retorts, leaving by the passage X, past the control damper Y, and up the vertical duct Z to the top, heating the two top chambers (as already stated) before entering the chimney. In the two top chambers the gases circulate in opposite directions, and the amount admitted to the lower circulating chamber L (sectional elevation) is controlled by the special damper at the chimney. A second chimney damper controls the pull on the top circulating chamber and on the whole setting.

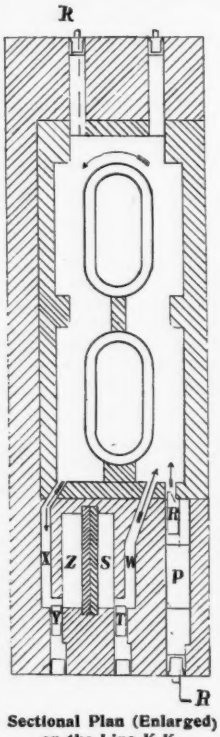
The method gives a large control of the heats, and permits of very exact adjustment of the temperatures at the different zones in the retort. It is also most economical in fuel consumption. The adjusting and balancing of the heats entails a considerable amount of work, and it is a wise policy to take such steps as will minimize the effect of the varying conditions of the fuel bed, and the pull of the chimney, which is affected by changes in the temperature of the atmosphere and the velocity of the wind. Such aids as Brooke's vanes are, therefore, very useful; but of these I have had no personal experience. A gauge fixed at the chimney ensures the pull being kept constant, so that the secondary air is also constant, and nothing requires to be touched but the primary air slides. It is also advantageous always to use the same coke in the producers; but it is somewhat difficult to keep any one coke separate when various coals are being used.

Typical vacuums and temperatures in the Helensburgh settings are as follows:—

	Vacuums.		Temperatures.
Waste gas outlet, bottom	B. 9-100ths	B.	1690° Fahr.
	C. 8-100ths	C.	—
	D. 6-100ths	D.	1880° ,,
	E. 5-100ths	E.	—
	F. 4-100ths	F.	2176° ,,
	G. 2-100ths	G.	2228° ,,
	H. 1-100th	H.	2246° ,,
	K. Level	K.	—
Chimney, below damper	7-100ths	L.	—
Primary air	10-100ths	M.	—
Secondary air	6-100ths		



Sectional Elevation on the Line R.R.



Sectional Plan (Enlarged) on the Line K.K.

I am sorry I could not sight pyrometer on the chambers not observed; but the temperature in the top combustion chamber may be taken as about 2300° Fahr., and in the lower circulating chamber about 1500° Fahr. There is always to be observed some little difference between the temperature on the combustion side and the outlet side of retorts. I believe in having the greatest heat as near the top as possible.

There are no special features connected with the starting-up of the settings. Each producer is divided in two by a division wall, and each producer heats four retorts in settings of two, each setting having an independent flue. It fairly often happens that only one setting is at work; and when lighting-up its neighbour, care has to be exercised to see that fuel gas is ignited immediately the damper is drawn. Failure to observe this led on one occasion to an explosion, caused by a rush of flame through the damper when the fires were being pricked.

I have an idea that control dampers on both fuel-gas inlets and waste-gas outlets are unnecessary, and that one of them could be dispensed with, and so reduce the number of adjustments to be made. The quantity of waste gas leaving the chamber should regulate the quantity of producer gas drawn in. I recently tried leaving the fuel-gas dampers full open, and adjusting the waste-gas dampers. The trouble I had was that the top part of the retort got too much heat and the under part too little; but I hope to continue the

experiment when we have fewer retorts working, and will finally prove whether my notion is right or wrong.

It is necessary to regularly clean the flues from the deposition of dust carried into them from the producers, and clear the waste-gas dampers from "fur" which grows on them, and which, if allowed to remain, would choke the circulation, on which depends the successful heating of the settings. In this connection I might say that it would have been an advantage had the waste gas outlet been wider, so that a rod could easily be pushed round to ensure the neck, where the waste gas leaves the retorts, being absolutely clear. We manage this with a flat-iron bar, 1½ in. by ¼ in.; but it might be made a simpler matter.

The producers are cleaned every 24 hours, and filled with cold coke every four hours. The fire is pricked-up sufficiently often to keep a glow on the water in the ashpan. For a considerable time we only cleaned the producers every 48 hours; but there was a clinker growth on the front of the producer which was difficult to remove. Possibly this was caused by the front of the fire being banked with wet ash breeze, and the heat above not being sufficient to make the clinker run.

General.

The following points may be briefly noted. The retorts are worked at from level gauge to 0·05 inch vacuum in the collecting main. Any increase in pull lowers the jet. A very fine jet of steam is admitted at the bottom below the extracting worm to keep the worm cool, and maintain a level gauge at the bottom. Without this steam and with a level gauge on the top there would be 1-10th vacuum in the bottom, which must be prevented, as the machined faces of the mouthpieces are slightly worn by the action of the coke grit, and the doors do not shut absolutely air-tight. The collecting mains are cleaned out once a week. The tar fished out is fairly thick, and the quantity averages about six gallons per setting. We have had very rare troubles with choked off-takes or pitched mains.

The retorts are scurfed every eight weeks. We generally try to put off both retorts in a setting at one time, so as not to be carbonizing coal in one while scurfing the other; but it has not always happened that we were able to do this. The carbon is burned off; and it is generally about 36 hours after being empty before the retort is filled with cold coke and started to work. We have run retorts longer than eight weeks; but there is then a tendency to hanging-up, through carbon restricting the movement of the coal. The greatest growth of carbon is at the centre of the retort, and very little top and bottom.

We have never had the whole plant hanging, but have occasionally had one or two retorts standing-off. This is done by letting coals burn below the mouthpiece, and then stopping the extracting worm. When the gas becomes thin, the ball is turned, and the remainder allowed to pass into the open air. The damper is reduced during the time the retorts are hanging.

The coke-chambers are emptied every two hours, and the coal-boxes filled every three hours.

Labour.

The vertical retort proclaims the disappearance of the stoker as we have hitherto known him, and his place will be taken by a more intelligent class of workman, who will have a fair understanding of the principles underlying the operations of the plant. For instance, in such a works as ours, the operator must be to a fair extent responsible for controlling the speed of carbonization according to the class of coals being wrought and the condition of the heats. Unintelligent control prejudices the results, and means extra responsibility for the official in charge, who can hardly be on the ground all the time. I therefore think such wages should be paid as will attract men of the handy artizan class, able to take care of the mechanical parts of the plant.

In Helensburgh, the retort operators look after the carbonization from the coal in the hoppers to the coke in the yard, attend to the exhauster engine, boilers, pumps, and gasholders, and take hourly reading of the station meter. The maximum number of retorts for one man is eight, when the cost of carbonization from the coal in the hopper to the coke in yard is:

Wages—Four men, eight-hour shifts, at 5s. 3d. = 21s.
Coals carbonized per day, 22 tons = 11½d. per ton.

One man per shift could do the work; but we have a second man on the night shift, as it is felt to be unsafe to leave one man alone in the works all night. The greatest number of retorts we have had at work so far is twelve, and the minimum four. The above figure therefore is meantime the lowest achieved; being only equalled when we have twelve retorts on with six men. The cost per ton at the minimum make is, of course, double this figure. Over the year ended the 15th of May last, the labour cost per ton, coal hoppers to coke yard, averaged 1s. 5·25d. The labour cost of discharging, elevating, and breaking coal was 1·6d. per ton.

Candle Power and Calorific Value.

It is not to be expected that high quality will accompany high makes. But nevertheless the candle power of the vertical retort gas is low; and our experience is that the plant is not readily adapted to the manufacture of high-quality gas. The ordinary method of increasing candle power by reducing retort temperatures has no very beneficial effect; while if speed of carbonization is kept up, the charges coming off smoky reduces the make per ton, and destroys one of the advantages claimed for verticals—cleanliness. Any tendency to stewing is bad. The quality is best when the coals are being carbonized as rapidly as possible.

However, in these days it is not so much high quality as steady quality that is required; and undoubtedly the quality of the gas made in the verticals is very regular. The conditions to be observed are that the heats in the settings should be properly proportioned, and that there should not be too great a difference in the class of coals succeeding one another in the retorts, requiring different speeds of working.

We try to make a straight gas of 14½ candles, and on the whole are fairly successful. We have a jet photometer fitted at the meter outlet and one on the burgh outlet, both adjusted to readings of the photometer, and these are kept regular to 5 per cent. If the jet drops below standard, a little benzol is used to enrich the gas. The loss of sperm value in vertical retorts, compared with horizontals, is difficult to explain, and one can only theorize. At the top of the retort we have low boiling-point hydrocarbons driven off, and these, travelling through cool coal, are not subjected to cracking, and are readily condensed. It is these products which probably cause in greater part the presence of paraffins in the tar; and when it is made possible to obtain the conditions which will cause the cracking of these paraffins into permanent gas, then the quality of the gas will be improved.

I subscribe to the opinion expressed by Dr. Colman, that lower down in the retort the travel of the major portion of the gas evolved is through hot coke at the sides, and up the walls of the retort, only passing through the cool core at the top, and joining such small quantities of gas as travel through the core. Occasionally we find the coke spotted with carbon, proving that unsaturated hydrocarbons and methane are being cracked into hydrogen and free carbon. If the travel of the gas was through the core, the gases would not be subjected to a greater temperature than that at which they are driven off, and would reach the outlet unchanged. The composition of the gas does not support this theory. The greatest growth of carbon being at the centre of the retort would show that the greatest quantity of richer gas is evolved there. In the underpart of the retort we have a body of incandescent coke which is giving off low-quality gas, hydrogen and carbon monoxide, so reducing the candle power. The effect on the candle power of anything like a high temperature at the bottom is very noticeable.

Consideration of these points has given me the impression that it might be an advantage to work with a shorter retort. The heats could be so adjusted that the gas would be driven off more quickly, and, being less time in contact with hot coke, would not be cracked to the same extent. There would also be a smaller body of incandescent coke in the bottom, and a consequent reduction of the poor gas driven off there. My idea is perhaps somewhat nebulous and badly explained. The whole point is that such a long retort is hardly necessary to drive off all the volatile matter in coal, and that the more quickly gas can be driven off, and the shorter its travel in contact with hot coke, the better will the quality be.

The calorific value of the gas is much better than might be expected from its candle power; our calorific value running from 500 to 510 B.Th.U. net. The average of several recent analyses of our gas gives the following composition:—

CO_2	2·0 per cent.
Illuminants	2·8 ,,
O_2	0·1 ,,
CO	9·3 ,,
CH_4	29·1 ,,
H_2	53·3 ,,
N_2 (by difference)	3·4 ,,

Benzene vapour in the gas, 0·5 to 0·6 per cent.

The percentage of CO shows that the steam admitted at the bottom is not forming water gas to any extent, as without steam there would hardly be less than 8 per cent. in the gas. The carbon monoxide is a constituent which must be kept low, as its short flame causes a greater volume of gas to be used, and leads to complaints about large gas bills.

Tar and Ammoniacal Liquor.

Our tar and liquor are sold mixed; and, running to a common well, it is difficult to properly estimate the quantities of each. Fortunately, however, the distiller who has been taking our tar and liquor for almost four years has been able to inform me that the proportion of tar to liquor is 1 part tar to nearly 4 parts liquor. On a yield of 66 gallons of tar and liquor per ton of coal carbonized, this gives us 14 gallons of tar and 52 gallons of liquor. The liquor is sold at 5° Twaddel, and the strength, as obtained by an average of tests, is 1·55 per cent. NH_3. On 52 gallons per ton, this gives a yield of sulphate equal to 31·4 lbs. per ton of coal carbonized. Recent analyses of two samples of our tar gave the following results:

	Percentage by Weight.	Percentage by Volume.	Sp. Gr.
Water	1·3 ..	1·4 ..	1·00
Light oils, to 170° C.	5·0 ..	5·7 ..	·928
Carbolic oils, 230° ,,	16·0 ..	18·5 ..	·989
Creosote oils, 270° ,,	8·9 ..	9·9 ..	·970
Anthracene 310° ,,	7·9 ..	8·1 ..	1·032
Pitch (soft)	60·9 ..	— ..	—

Free carbon in tar, percentage, 3·4
Sp. gr. of tar. 1·074

Re-distillation of light oils gave:

Loss in washing	20 per cent.
Benzol 80° to 81° C.	13 ,,
Toluol, 109° to 112° C.	15 ,,
Solvent naphtha	52 ,,

The low percentage of free carbon in the tar is excellent. The pitch is very soft, but could easily be made harder by continuing

the last fractionation 20° or 30° higher. The percentage of benzol and toluol is low.

I submitted these results to the distiller; and he informs me that they agree pretty closely with results obtained by him, though the percentage of water is too low, and pitch rather high. But as he distils to 350° C., the latter difference is readily explained.

A condensed version of the distiller's observations on vertical retort tar (he is dealing with vertical retort tar from three different works) may be of some interest. He writes:

"The water is difficult to separate out. The paraffins contained in the tar are very undesirable, though it is not material if naphtha oils are required only for commercial purposes; but if chemically pure benzol, &c., is required, the paraffins are a great trouble. Crysilic acid is not so good as horizontal crysilic acid. There is practically no pure carbolic. Rather more creosote than in horizontal tar, but practically no naphthalene. Anthracene is spoiled by the presence of paraffins. The pitch is much better than horizontal pitch."

Coke.

The coke produced is, practically irrespective of the class of coal used, of clean and bright appearance, light, hard, and dry. It does not take up water. Being a residential town, we have no local industrial use of coke, yet our local sales average 60 per cent. of the total coke sold. The coke is used for greenhouses, bakers' ovens, central heating systems, &c.; and customers say it suits their purpose admirably. Though we do not push the sale for domestic use, we have a number of regular customers, who say that, if mixed with a little coal, it gives a fine fire.

In the open market the coke meets with a ready sale, and fetches a rather higher price, though the increase is not what it should be considering its dryness and general quality. But unfortunately a large number of coke-buyers seem to think more of price than of quality.

Maintenance.

The cost of maintenance and wear and tear of vertical retort installations is the subject of much interest, and reliable information on these points is eagerly awaited. I am afraid I cannot add much to the sum of our present knowledge of the matter, but will give you a statement of the number of days each setting has been at work, and a report on their present condition, with a note of the expenses of maintenance incurred from the commencement of work to the present date (30th of January).

—	No. 1 Bed.	No. 2 Bed.	No. 3 Bed.	No. 4 Bed.	No. 5 Bed.	No. 6 Bed.	No. 7 Bed.	No. 8 Bed.
Days working . .	693	801	550	394	620	537	383	312

Beds Nos. 1 and 2, first started to work, ran 566 days and 680 days respectively before being let-down.

During last summer we thoroughly examined all the retorts not at work, and found, as was only to be expected, that several showed cracks and fissures. The largest cracks were at the centres of the retorts, and were about 1 inch wide at their greatest width.

We put a man down into the retorts on a "bosun's" chair, and thoroughly repaired all cracks with fire cement, inserting a scone brick into the widest, afterwards washing the inside of the retorts with thin cement. Both "Korktite" and "Tamac" cements were used; and it is worth noting that these should be mixed two or three days before being required, so that they attain to a nice degree of toughness.

The total cost of patching eight retorts was:

Cement—5 cwt., at 9s. 6d. per cwt.	£2 7 6
Labour—200 hours at 6d. per hour	5 0 0
	£7 7 6

We also relined bottom part of two producers, the cost being:

300 square bricks, at 55s. per 1000	£0 16 6
Labour—40 hours at 6d. per hour	1 0 0
	£1 16 6

We have just finished scurfing all the retorts, and have taken the opportunity of carefully examining them, and I am pleased to say that all are standing splendidly—being regular in shape, and showing very little signs of wear. So far as we can judge from inspection through the sight-holes the flues are in good condition throughout.

It would be unwise to give any very decided opinion; but I do not think I am outwith the mark when I say that we should obtain six years' work from each of the settings. The retorts will easily be renewed by removing the top ironworks, gutting out, and rebuilding from the bottom without interfering with the main shell of the building. In answer to my query, West's Gas Improvement Company informed me that the approximate cost of renewing eight retorts, including new retorts and a proportion of the silica floor tiles, &c., and labour complete, would be £500.

The machinery part of the plant is all very slow moving, and has required very little repair.

In the early days, we had a little trouble with the breaking of safety bolts on the ratchet pawls, and bending of lever arms. We soon found this was caused by a growth of hard soot round the casing at the worm, causing the worm to work stiffly. Since then, when scurfing retorts, we always clean round the worm, and the trouble has ceased.

The cost of repairs to date is:

1 wire rope.	£1 3 0
Safety bolts	1 6
6 springs for extractors	1 3
5 bent levers ,, ...	2 0 0
6 pawl teeth	2 5 0
	£5 10 9

The coal and coke elevator has broken down on three occasions, only once seriously; the breakdowns in each case being caused by the breaking of the spindles between the guide wheels. These broke through split pin holes at the side of the chain. In repairing them we encased the new rod in a piece of 1-inch malleable iron tube of a length equal to the inside distance, and we are now gradually strengthening other rods in a similar manner. In the first breakdown, which happened near stopping time, we worked all night to have the elevator working by 10 a.m. the following day.

The cost of repairs is:

1 foot chain	£0 9 6
15 new spindles and M.I. tube.	2 10 8
Labour	2 11 0
	£5 11 2

Incidentally, I might say that there is a certain amount of insecurity in having no subsidiary means of elevating coals—say, a simple hoist—as a very serious breakdown in the elevator which could not be repaired in time would necessitate carrying coals to the hoppers to prevent stopping the plant.

Results.

I give you vertical retort results from the day of starting to the 31st of January, 1915, and for the financial year 1913-1914. Through the kindness of three of my friends (whose reputation for successful horizontal work with hand stoking stands high), I am enabled to give you, for purposes of comparison, the average of the results of three works for the year 1913-14. Their coal is similar to that used in Helensburgh.

	Verticals.			Horizontals. Average Three Works Year 1913-14.
	July 6, 1911, to Jan. 31, 1915.	Year 1913-14.		
Coals carbonized, tons . .	23,308-10	6,538-18		7,413
Gas made	270,713,900 c.f.	78,260,000		83,233,166
,, ,, per ton	11,615 c.f.	11,968		11,228
,, ,, ,, mouthpiece .	31,000	31,500		9,550
Candle power, No. 2 "Metropolitan"	14·5	14·5		16·10
Sperm value	577	595		620
Calorific value, net . . .	505	505		530
Coke sold per ton . . .	9·05	9·44		9·28
Tar ,, ,, ,, gallons .	14	14		11·6
Sulphate ,, ,, lbs. . .	31·4	31 4		28·1
Coke used in producers per 100 lbs. coal carbonized .	13·5	13		18
Labour costs per ton, including stoking, attention to boilers, exhauster, holders, governors, and also coal emptying	1/6·85	1/6·85		2/7·5
Gas used for motive power, extracting machinery, 61·8 cubic feet per ton at 1s. 9d. per 1000.	1·3d.	1·3d.	1/8·80	—
Gas used for motive power, coal and coke elevating, and coal breaking, 31 cubic feet per ton	·65d.	·65d.		—

The figures given are real figures, and provide the vertical retorts with a severe test, which I think you will agree they stand very well. In justice to the verticals, I may also state that, though there is a good difference between the annual makes of the largest and smallest of the three works, the labour costs are practically identical; while if carbonizing 7413 tons, our costs would be reduced by 2¼d. per ton.

Horizontals—Verticals.

In my concluding chapter I shall shortly review the considerations which must weigh with the engineer of a works of similar size to ours who is confronted with the necessity of selecting new carbonizing plant. I shall limit choice to verticals and hand-stoked horizontals.

Beginning with capital cost, the vertical retort installation at Helensburgh cost £9000 complete, while I estimate the cost of a good horizontal retort-house, with bench, &c., complete, at £4300—a difference of £4700. Taking 7½ per cent. on the increased cost gives us £352 10s. which must be saved by verticals to overcome the handicap of the increased cost. Now from our results we have seen that the saving in labour equals 10·7d. per ton—giving a total saving on 6538 tons coal of £291 10s. We have also an increased yield of 740 cubic feet of gas per ton, and more tar and ammoniacal liquor, which easily covers the remaining difference of £61, and leaves a good balance in favour of verticals.

The question of ground space is important, and might readily be the deciding factor. Our vertical bench occupies 820 square feet, the driving-engine house 455 square feet, the coal-breaking and coal and coke elevating plant 412 square feet, the retort-house, covering all, occupying 2800 square feet inside. Our horizontal retort bench would require 1000 square feet, and the retort-house 4200 square feet inside. So that we have a saving in ground space of 1400 square feet.

The vertical retorts also solve the labour problem in places

where it is difficult in the winter time to obtain skilled hand stokers.

Our experience also seems to confirm the faith of those who believe that the cost of renewals and repairs with verticals will be less than with horizontals.

On the debit side of the account may be placed the somewhat greater attention required by the verticals, and the lower candle power—for the flat-flame burner in provincial towns dies hard.

Summing all up, the advantages are in favour of verticals, and their adoption in works of our size is fully justified.

Gentlemen, the time is come to compare "the petty done with the vast undone," for my task is ended. It has been a great pleasure to me to write the paper. I hope you have been interested, and that there will be a good discussion. I have to thank most sincerely those friends who have given me figures and lent me apparatus to make tests, and so contributed in large degree to whatever of value the paper contains.

DISCUSSION.

Mr. J. S. M'Nicol (Dawsholm), in opening the discussion, said at a time like the present, when so many undertakings looked to improving their carbonizing plants by putting in vertical retorts, they should be indebted to Mr. Fulton for bringing forward such a valuable paper. He did not, however, agree with certain points dealt with. For instance, the author mentioned, in connection with carbon restricting the movement of the coal, that the greatest growth was at the centre of the retort, with very little at the top and bottom. This was rather an unusual thing; for the greatest amount of carbon was generally found at the top. At the bottom of the retort the heat was greater, and the pressure was also greater, owing to the steam going in at the bottom. This might account for the locale of the carbon deposits, together with the fact that the steam would prevent carbon from forming. Mr. Fulton also subscribed to the opinion of Dr. Colman—that lower down in the retort the travel of the major portion of the gas evolved is through hot coke at the sides, and up the walls of the retort, only passing through the coal core at the top. He was afraid that he could not here agree. Dr. Bueb, who was the pioneer of the intermittent vertical retort, had made it quite clear that the gas did travel up the core in the retort; and this fact had been borne out by Mr. Drury, at the Sunderland Gas-Works, who found a deep fissure through the core, and had seen the illuminating gases go through the core. The external layer of coal was first carbonized; and owing to the compression through the weight of coal and swelling, it acquired a very close consistency. Thus the gas could not so readily pass through the dense coke, and so took the path of least resistance, which was through the still uncarbonized coal in the centre of the retort. The gas did not come in contact with the highly-heated surfaces. If Mr. Fulton's theory were correct, that the gas passed through the incandescent coke and up through the retort walls, then naphthalene would be formed, as the heavy hydrocarbons, such as benzene, were decomposed by superheating into naphthalene; and it was a well-known fact that there was little naphthalene in vertical-retort gas. Then, again, more cyanogen would be formed and less ammonia. But with the vertical retort, the reverse had been found—there was practically no cyanogen but an increased yield of ammonia. Further, the author said the carbon monoxide must be kept low, as its short flame caused a greater volume of gas to be used, and led to complaints about large gas bills. He did not understand how Mr. Fulton reached this conclusion.

Mr. Graham (Dunoon) said that, as regards heats, Mr. Fulton stated that the temperature in the top combustion chamber might be taken as 2300° Fahr. If he increased to 2500°, putting more coal there, did he not think this would increase the calorific value and also the candle power? They found in Dunoon that they obtained better results than Mr. Fulton had given; but their retorts were only just in operation. In the South, it had been found that, by mixing five different coals in one retort, they could get a constant candle power of 14½. He would like to know if Mr. Fulton thought it would be better with the same coal in the same retort. He agreed with the author regarding the advisability of having smaller retorts. Their retorts in Dunoon were reduced by about 2 feet. As to the process of enriching by benzol, he would like to know if the benzol really carried in the gas. Would it not be better to mix with cannel coal?

Mr. D. T. Marwick (Temple) sympathized with the remarks on gum in the coals. They had found this difficulty too. Owing to this, there was considerable bother in carbonizing. They found they had to reduce the coal passing through the retorts. Different coals were also worse with a vertical retort. Each coal needed a different speed, and one had to watch this. It came by experience. What Mr. Fulton had noted about the heating of the retorts he did not quite understand. Was he not apt to get over-heating at one side and not so much round at the back? The remarks as to the gathering of the "fur" were interesting. When he read a paper last year, he said that in the Temple setting there was trouble with "fur" in the flues. This had been avoided by making the flues larger. As to the labour side, they all knew that the ordinary stoker was no use with a vertical retort. An intelligent man was needed, and he had to be taught to take an interest in the plant. It was not merely a matter of shoving in coal and taking out coke. It was really very difficult indeed to get men to work vertical retorts. Regarding the author's remarks as to temperatures, he was working at 2300° Fahr. at the top. Supposing he were to make it 2500° and use a better class of coal? With a higher temperature this candle power would be the same, and he would get a larger make. As to calorific values, Mr. Fulton's value ran from 500 to 510 B.Th.U. for a 14½-candle gas. If this were compared with the same candle power in England, the B.Th.U. would be much smaller. It seemed in Scotland they got more. He agreed with the references to the length of the retort. At Temple, they had 20-feet retorts; and he thought they could get as good a make as at Dawsholm with the 23-feet retorts. With regard to the steam which was passing in, and not forming water gas to any great extent, What was it doing if it was not forming water gas? What was the value of the vertical retort tar as compared with the horizontal retort tar? He had to congratulate Mr. Fulton on his 1·6d. per hour for labour. Vertical retorts did require special attention. When all was said and done, in a small works like Helensburgh one could not get the full value out of the vertical retorts. To do this, one needed a make of a million cubic feet per day. It was true that a lower sperm value was obtained with vertical retorts. The advantages were that one obtained more tar and a higher make of sulphate.

Mr. W. Dickson (Johnstone) remarked that, in comparing "the petty done with the vast undone," the author had gone a long way in helping them to arrive at the comparative merits of the different carbonizing systems. In fact, the more one studied the matter, the more one was impressed with the fact that during the past five or six years the gain in carbonizing results had been obtained by filling the retort full. No matter on what plane the retort lay, the results, so far as make per ton and the constitution of the gas, were very much the same. Regarding the choice of the coal, no difficulty had been experienced by them. Fourteen different collieries were sending coal to them. Any difference in the weight after the coal came out was negligible. Mr. Fulton contended that the greatest heat should be near the top of the retort. Did he not think that a better result could be obtained by applying the highest heat where the retort was coolest? It was interesting to find that tar had been fished out of the hydraulic main. He had understood that they alone had been troubled with this sort of thing. There was no doubt that while the vertical retort was likely to be the means of carbonizing in the future, the amount of supervision it required was very much greater, and the best results could only be obtained by constant and unwavering attention.

The interim Secretary (Mr. Littlejohn) read a communication from Mr. Thomas Carmichael, the President of the Association.

Mr. Carmichael's communication was as follows: "I have to congratulate Mr. Fulton on the production of a very able paper, giving full details of his experiences of the working of the Glover-West vertical retorts. In heating-up a setting, if explosions are to be prevented, it is a very important point to have the gas off-take flues and part of the combustion chambers at a good red heat before closing-up the producer. I find with vertical retorts a good system to adopt is to have a brick temporarily taken out in the front wall of the producer, some little distance above the level of the false fire-bars, so that when the other fire-bars are covered over with coke, secondary air can be admitted, and the carbon monoxide produced burned to carbon dioxide above the fuel bed and on entering the gas-flues. I have also tried a coal-gas jet in the producer-gas flue, to ignite any gas coming forward. I have in mind a case of one explosion which took place in the regenerators of a vertical-retort system. The producer had been capped, and an excess of producer gas found its way into the black regenerators, where air was being drawn in through the sight holes; and in a very short time every plug was blown out with considerable force. I should like to know if the temperatures are uniform on both sides of the retorts. In the 'Glasgow' system, we found, after practical testing with various flue arrangements for guiding and travelling the heating flames, that the horizontal one was the best. I mean by this, straight across setting, with no turning round the end of the retorts. The system shown by Mr. Fulton I call circular travel; and it was found in our tests that the gas and air nostrils in the chambers required to be almost parallel to one another to obtain anything like a uniform heat. On the plan Mr. Fulton shows these at 45°. Does he not get some local heating—too much mixture of gases at the nostrils? Would Mr. Fulton kindly explain why the banking of the producer with wet ash-breeze should cause a clinker growth and trouble at the front of the producer? I always understood this to be a preventive, and it undoubtedly is. Should there not be more than 1-10th pull at the bottom of the retorts? Does he not put his ideas into practice, for we see from another part of the paper that most of the carbonization is carried on near the centre of the retort? I am pleased to note that Mr. Fulton tries to make straight coal gas. This is also seen from his analysis. The least satisfactory way of making low-grade gas is to work with a heavy pull."

Mr. R. Barr (Kilmarnock) said he was interested in verticals just now, as they were getting the intermittent system put up at Kilmarnock. He also would like to know if Mr. Fulton had tried cannel coal. Was it possible to work it through this system? Something had been said about dust collecting in the flues. Were there no means of closing the damper marked P? Would this not obviate it? In the setting they were putting up just now, there was a damper at the side of the furnace; and by closing this it obviated any dust getting into the flues. Should there be any dust get in, there was a pot at the back end of the setting where it could be collected without trouble.

Mr. Littlejohn said the paper showed there was still a lot to be

done in the way of carbonization in verticals. The part that interested him most was that dealing with the different gases that went off in various parts of the retort. Mr. Fulton said that the greatest amount of carbon deposit was at the centre of the retort. It seemed to him that this deposit was due to hydrocarbons being broken-up at the hot sides of the retort. This might be prevented by taking off the gases at this part.

Mr. H. G. RITCHIE (Irvine) considered it was advisable to have the coal bunkers divided. They had six retorts, and the bunkers were divided into three. They used three different classes of coal in three retorts, and found it very convenient. The verticals certainly took more supervision than horizontals; but it was worth it. That the heat must be at the top of the retort was his experience.

In closing the discussion,

Mr. JOHN WILSON, speaking of the difficulty with coals containing much gum, said they had the same trouble with horizontals. If one put gum into a horizontal retort, it could not be burnt off at the same time as large coal. With regard to Mr. Fulton's remark that "the machined faces of the mouthpieces are slightly worn by the action of the coke grit, and the doors do not shut absolutely air-tight," was this not a plea for the water seal? It was most important at the present time to find there were customers mixing coke with coal. If this were better known, they would get a larger sale for their coke. One question necessary to consider in the adoption of verticals was that of the weight per square foot on the foundations. Verticals gave even more than three times the weight per square foot that horizontals did. Before any manager adopted vertical retorts, he should be very sure of the nature of the subsoil. Mr. Littlejohn had mentioned the drawing of the gas away from the centre of the retort. This was, he thought, tried in a vertical retort a good many years ago, where the gas was taken off at portions going up, and no difference was found.

Mr. FULTON, in replying generally to the discussion, said that Mr. M'Nicol had asked why there was so much heat at the top and so little down below. He did not know; but that was what happened. In regard to the travel of the gas, Mr. M'Nicol had entirely dealt with points about the intermittent retorts. He (Mr. Fulton) thought that the travel of the gas in the intermittent retort and the continuous vertical retort was the same, and, as he had stated in his paper, the influence of hot coke on methane was very great. They did not use cannel coal, though they were able to use it. They used ordinary West of Scotland coal. As to the question of increasing the temperature at the top, their temperature was sufficient to give them 32,000 cubic feet per mouthpiece: and they were doing as well as they wanted to do. There had been several remarks on the length of the retort, and he should like to see a 16-feet retort tried. The small quantity of benzol they used would carry. On the comparative merits of cannel and benzol, both were dear; and if they all started to use cannel, it would become very scarce. It would have to be confined to one bed of retorts. Benzol, of course, was only used when needed. The necessity of having intelligent operators was one that would cause trouble in a change from horizontals to verticals. He had been asked, on the subject of the introduction of steam at the bottom, what did it do if it did not make water gas? Of course, it was bound to make some water gas. When it paid better to have oil, the vertical tar was better; but when pitch was up in price, it paid better to have horizontal tar. Greater supervision was undoubtedly necessary for the verticals; and, as in everything else, extra supervision was bound to pay. Mr. Marwick was not quite right in stating that the only value of verticals lay in the fact that there were more residuals. He thought that his results stood out, and that the comparisons he had given showed that it paid to have verticals. Mr. Dickson spoke of the tendency being to full charges, no matter what kind of retort was used. Undoubtedly it paid. Different classes of coal carbonized at different rates of working; and he thought Mr. Dickson would admit that different classes of coal were bound to have heavy draws and light draws. It was wise to have bunker sections. The Glover-West system was not constructed to have the greatest heat at the top. The two top chambers were only heated by waste gas. One could hardly arrange to have the greatest heat at the top. If one had the greatest heat there, one was bound to limit oneself to certain kinds of coke. The greatest heat at the top meant hanging charges. As to variations of coal giving trouble in horizontals, he might say that in horizontals they saw what they were putting in—they knew if they were putting gum in. The domestic use of coke might be pushed. Any engineer worthy of the name would pay attention to the subsoil.

The author was awarded a hearty vote of thanks; and the proceedings ended.

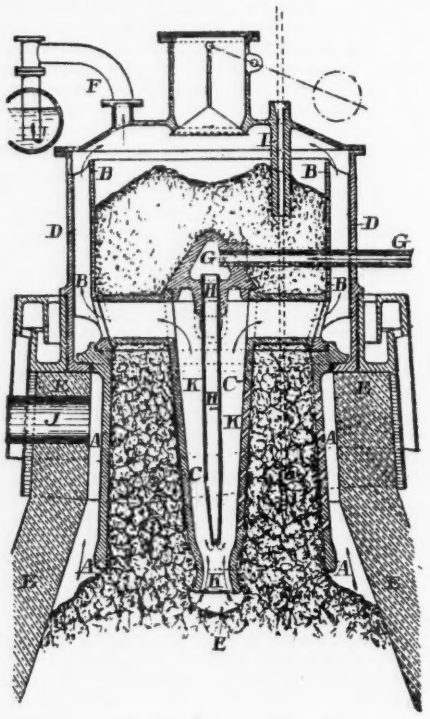
The Halifax Town Council last week withdrew various schemes which, in the aggregate, were to have cost something like £50,000. These included the borrowing of £35,000 from the Local Government Board to enable a carbonizing plant to be erected at the gas-works, and the acceptance by the Committee of the tender of the Woodall-Duckham Vertical Retort and Oven Construction Company, for the execution of the work required in the erection of a vertical retort-stack, at the cost of £33,276. The proposals were withdrawn without discussion.

FEED-HOPPER RETORT FOR GAS-PRODUCERS.

A patent has been taken out for France by MM. Henri Mastaing and Louis Monnier for a retort for distilling, at very high temperatures, the fuel to be supplied to gas-producers. Application has been made for an English patent; but it has not as yet been granted. The following particulars are translated from the French specification [No. 469,967 of 1914].

The retort which is the subject of the patent is so constructed as to act as a feed-hopper for a gas-producer. It works at a very high temperature, and is intended for any kind of fuel which cannot now be utilized. It operates in such a way that the fuel does not reach the ignited column to be gasified until it has been thoroughly coked, made permeable, and freed from all bye-products. Consequently a rich gas is produced, which mixes with the poor gas generated in the chamber, and the calorific power is increased. The patentees claim that the retort makes it possible to gasify all kinds of fuel continuously, which cannot at present be done, because as soon as the fuel is put into the retort the mass becomes hot, distils, swells, and solidifies into an impenetrable mass. The producer is then useless, and if a poker or a mechanical stoker is used in order to break up the mass to render the various parts permeable, the only result is the formation of so many channels through which a mixture of air and gas makes its escape, to burn intensely in and melt the upper part of the producer.

The accompanying illustration represents a vertical section of the retort placed on top of a producer.



The apparatus is usually constructed as follows: Above the column of permeable coked fuel which is burning in the chamber is placed the retort, which consists of several refractory pieces, A, B, C, fitting together, and easily changed. The top part D forms the head of the producer; its lower part resting on the top of the refractory bricks E, which line the sides of the chamber. It is on this piece and on the ring forming the bottom of it that the rim of the outer conical jacket A rests. The piece B, the base of which is tapered to a cone, and in which the charges of fresh fuel accumulate, is placed in D, and it supports the hollow central piece F, the length of which is 6 ft. 6 in. to 9 ft. 9 in., and the form that of a conical tube secured at the top by three hollow arms, straight or slanting, and resting against the conical base of B, and opposite corresponding openings. The lower part of C, which forms the centre of the retort, is open; while the higher part receives a hollow cap, in which there is a nozzle G from the exterior, and a tube H of very refractory material ending in a cone at the base. In the lower part, and for a height of about 3 ft. 3 in., the retort jackets are perforated with openings for the entrance and exit of the gas. The top of the piece D is provided with a lid supporting a tank, governed by a valve, guides I, running deeply into the fresh fuel, and a take-off pipe leading to the hydraulic main, in which there is a reduced pressure.

For starting the producer, it is filled with coke to a level with the base of the jackets of the retort, which is then filled with fuel to be coked. The fire is ignited, and suction of the gaseous products is effected by an exhauster branched on the pipe J and on the hydraulic main, or on the latter only. The column of coke is

soon ignited in its entire height, and heats all the plant by conductivity. The gas produced then escapes at a temperature of 600° to 700° C. (1112° to 1292° Fahr.) lapping the sides of the retort on both the inside and outside. As it is requisite to obtain very rapid distillation by means of intense heat, attaining 1000° to 1200° C. (1832° to 2192° Fahr.), which cannot be given by the gas passing away, this heat is produced in the fuel by combustion of a portion of the gas. For this purpose the pipe G, which communicates with the exterior, conveys pure air under pressure into the space shown, and thence to the tube H, from which it is driven, superheated, into the gas ascending in the space K. Owing to this inflow of air, the gas burns, and carries to all parts of the interior of the retort the great heat required for coking. Of course, the products of this partial combustion are drawn away with the gas. As the retort has a large opening widening out downwards, the coke fuel carbonized in the lower parts is divided and pushed down, falling by its own weight into the chamber as the distilling column gradually decreases. Nevertheless, to avoid all adherence to the sides, a poker can be driven in, through the pipe I, to loosen the lumps which prevent the descent of the coal.

MOTOR FUELS.

Professor Vivian B. Lewes, in his final Fothergill Lecture at the Royal Society of Arts on Monday last week, dealt with cracking processes for obtaining lighter spirits suitable for motor-car purposes. In this he necessarily, to some extent, covered the ground previously traversed by Dr. Mollwo Perkin.

Cracking, he said, of course, consists in heating the oil to a temperature just short of decomposition—generally under sufficient pressure to prevent the evolution of any very large proportion of gas. Under these conditions the heavier molecules dissociate, and fresh arrangements of the carbon and hydrogen groups take place, until in all probability a condition of equilibrium is produced. The general action seems to be that, starting with a heavy paraffin molecule, this splits up into molecules of saturated and unsaturated hydrocarbons—the latter consisting of olefines and naphthenes. The most successful cracking process on a commercial scale at present evolved is used by the Standard Oil Company in America, for increasing the yield of petrol obtained from the crude oil. It is known as the Burton process, but is, in reality, identical with a process patented by Sir Boverton Redwood and Sir James Dewar in 1889. The process consists of distilling and condensing the heavy residues under four or five atmospheres pressure, in large vessels, at 500° C.; while in other processes of somewhat similar character the oil or oil vapour is passed through coils of heated tube, and then undergoes condensation or cooling in condensing coils—such a form of apparatus allowing far higher pressures to be used with safety. These processes are purely dissociation; and if the temperature is so regulated as to prevent decomposition giving gaseous products, no carbon is deposited in the heating tubes. But directly gas appears in any quantity, asphaltic bodies and carbon appear in the residual oil and lead to choking and other troubles.

In the interesting method of cracking devised by Mr. W. A. Hall, something more than mere dissociation is arrived at—decomposition and recombination also playing an important part. In this process, the oil is vaporized, and the vapour passed at a rapid rate of flow through a great length of tube heated to about 600° C., under a pressure of 60 lbs. The pressure is then suddenly lowered, and the heavier portions are cut in dephlegmators. The vapours and gases are then condensed together under a pressure of 100 lbs., which leads to not only condensation of the vapours of pentane, but apparently to the nascent gases polymerizing and forming fresh compounds with the other molecules present. The result is a far more complex mixture than that produced by dissociation alone, as besides the paraffins, the olefines, and the naphthenes, there are also found aromatic hydrocarbons, acetylenes, and terpenes.

During the past ten years several processes have been brought forward in which steam or water has been introduced into the cracking ducts with the oil; the idea being that hydrogen from the water would affix itself to the heavy hydrocarbons, and hydrogenate them into lighter hydrocarbons. To aid this action, catalysts have been frequently used—nickel being the most popular. The idea of the use of nickel as a catalyst is now 27 years old; as, in 1888, Ludwig Mond took out an English patent—No. 12,608 of that year—in which he mentions the treatment of hydrocarbons together with steam by passing them through heated vessels containing fire-brick or iron oxide. He states that if metallic nickel is used, in place of the iron oxide, then only a moderate temperature is required.

About the year 1900 Sabatier and Senderens studied the action of nickel and other metallic catalysts on the hydrogenation of oils; and in the following years there were many more patents taken out in America by Day, Ellis, Kayser, and others, dealing with the use of nickel as a catalyst. Mond, Sabatier, and Senderens all recognized that such surface-action as the nickel would exercise took place only at temperatures below at any rate 300° C.; but the more recent exploiters of the idea have drifted-back to the heats one would use for cracking, not for hydrogenation.

Coke for Motor Vehicles.

Professor Lewes did not touch upon the question of low temperature carbonization; but a point of interest to gas undertakings was his prediction that in the comparatively near future coke will completely oust petrol as a fuel for commercial motor vehicles. This possibility has been brought into existence by the development of a new form of steam-boiler by Mr. Clarkson (of omnibus fame), in which coke graded to pass through a 2-inch mesh, but held by a 1-inch mesh, is automatically fed. Experiments have shown that purchasing this fuel at 18s. per ton—a price, said Professor Lewes, at which the Gas Light and Coke Company will sell any quantity carefully graded—gives a cost for fuel of 17 ton-miles gross for 1d. This is roughly half the cost compared with petrol purchased in large quantities at 10d. per gallon; and, obviously, the comparison is much more favourable in the case of small traders who have to pay, say, 1s. 4d. per gallon for their petrol. Gas coke is a home production, and its price is not likely to be affected in the same way as the price of petrol, the supply of which is in the hands of a few powerful and wealthy corporations. This will, said the lecturer, be a strong incentive to the large number of small traders who are now holding back from changing-over from animal to mechanical traction.

CORRESPONDENCE.

[We are not responsible for opinions expressed by Correspondents.]

The "Total-Heat" Calorimeter.

Sir,—Your editorial comments on Mr. Newbigging's remarks respecting "Total-Heat Calorimeters" are so much to the point, and so fully cover the ground, that there is very little I can add to them. The essence of the whole question is that gas managers should read the words "Total Heat" as meaning exactly what they say—*i.e.*, the maximum heat. This is a question of principle, and is far more important than any controversy as to particular types of calorimeters. The fact is that the calorimeter which gives the highest result must be nearer the "Total Heat" than one yielding a lower result.

As the maker and designer of the "Total Heat" instrument which Mr. Newbigging has been using, the matter possesses very great interest for me; but, reading Mr. Newbigging's paper, I am inclined to look at it from a different point of view.

In the "Journal" for the 9th ult., p. 312, you gave figures which purport to be the summary of gas testing in London; and with your permission I will refer to some of them.

London Gas for 1914.

	Calorific Power.		Illuminating Power.		B.Th.U. per Candle.
Gas Light and Coke Company .	134·9	..	14·32	..	37·6
South Metropolitan	140·6	..	15·31	..	36·7
Commercial	134·2	..	14·40	..	37·2
Average B.Th.U. per candle			37·16		

All tested on the Boys' calorimeter and No. 2 "Metropolitan" burner, as at Manchester.

I think that these figures, being the average of the enormous number of tests which constitute the year's working in London, give us some idea as to the relationship between calorific power and illuminating power.

The average calorific power of Manchester gas, by Mr. Newbigging's tests, was 558 B.Th.U.

I am, I think, justified in assuming that either Mr. Newbigging's gas is no longer of the candle power with which it has been hitherto credited, or that he has found a means of increasing the illuminating power at the expense of the calorific power (which I do not think possible), or the calorific figures given as the results of the testing on the two calorimeters are erroneous. In this case they constitute no guide as to the merits or demerits of the "Total Heat" system.

Jno. F. Simmance.

Westminster Palace Gardens, S.W., March 4, 1915.

Pitch Prices in the Manchester District.

Sir,—Referring to your last report of "Current Sales of Gas Products," we note you give the price of pitch as 23s. to 24s. per ton at makers' works. In the case of the Provinces, no figure is mentioned. But, in order that there should be no misunderstanding, we should like you to insert in your next issue that pitch was sold in Manchester at 17s. per ton f.a.s. for early shipment. This differs very much from the London figure.

Thomas Horrocks and Sons, Ltd.,
Manchester, March 3, 1915. per J. W. Horrocks.

Coke for Steam-Raising.

Sir,—In reference to the statement recently made in your columns [*ante*, p. 437], to the effect that the Huddersfield Corporation are now selling coke at 6s. 8d. per ton, the following notes may be of interest to your readers.

According to the electric supply costs and records printed by the "Electrical Times," the full cost per unit sold by the Wallasey Corporation in 1912 was 0·35d.; and the units sold totalled about 3 millions—this during a time when their power station was operating exclusively upon coke fuel (produced at the Corporation Gas-Works) at normal prices.

The fuel cost at Huddersfield for the same year, according to the same authority, with an output considerably more than double that of Wallasey, and presumably operating on coal fuel exclusively, was

o·3d. It might be a matter of interest to the authorities (gas and electric) at Huddersfield to know that many of the more important power stations in London and elsewhere are now using coke fuel extensively for steam-raising.

That one department of a corporation should be giving away smokeless fuel in a smoke-laden district, at the expense of their ratepayers, while another department is probably paying inflated prices (also at the expense of the ratepayers) for fuel of an inferior grade, is surely somewhat in the nature of a scandal.

Perhaps the Local Government Board authorities will bear this point in mind when the next extension to the Huddersfield electric power station is proposed; so that suitable stoking apparatus may be installed to use coke fuel. Meanwhile, some slight modifications to the steam plant might be made, with a view to turning out cheaper units, with less than the usual amount of smoke, by taking advantage of the opportunity offered by their colleagues in the Gas Department.

A I.E.E.

London, March 2, 1915.

Science v. Superstition.

Sir,—Although not privileged to make that close acquaintance with persons and things resulting in knowledge hidden from the ordinary mortal which would seem to offer to the special constable of inquiring mind some compensation for the night watches endured for the sake of King and Country, the Irish gas manager will be able to testify that the belief that wetting of coke causes it to burn to better advantage is "widespread and sincerely held"—in Ireland, at least.

Not having much time for scientific or psychological conjecture, the gas manager over here is content to leave the justification of the belief from those standpoints to others; and he only regrets that the belief carries with it no illusion as to where the wetting process should be carried out, which might permit him to minister in regard to same in a manner less likely to incur suspicion than is the case at present.

That the practice has something more than superstition to support its claim, I am convinced; though to find a scientific reason is not so easy. It may be that wet coke being darker than dry coke, there is a greater contrast between the glow of the ignited coke and the unignited coke in the early stages of combustion, which gives an appearance of greater heat, after the manner of those gas-fires supplied with fuel resembling coal.

Whatever may be the reasons, they are satisfactory to the user, which is more than can be said of other devices and expedients having recognized science for their sponsor.

"Wet Coke."

Ballina, March 6, 1915.

PARLIAMENTARY INTELLIGENCE.

HOUSE OF COMMONS.

The Skegness Gas Bill has been reported, with amendments.

The Metropolitan Water Board Bill was read a second time and committed last Thursday; but the Deputy-Chairman gave notice to move that the proceedings were null and void, and that the second reading should be taken on Tuesday [to-day].

The Battersea and Camberwell Borough Councils have withdrawn their petitions against the above-named Bill; and the Chelmsford Gas Company and the Chelmsford Rural District Council theirs against the Chelmsford Corporation Gas Bill.

The Southend Water Bill has been removed from the group of Bills under consideration by Sir W. Howell Davies's Committee, and referred to the Committee on Unopposed Bills.

CAPITAL RESTRICTIONS CLAUSE.

The clause which the Treasury proposes to insert in all Private Bills this session relating to expenditure of capital by public bodies, referred to in connection with the Skegness Bill, was also mentioned on Thursday by the Chairman of the Unopposed Bills Committee of the House of Commons. He said that a similar clause will be inserted in all Provisional Orders.

Mr. Moon, K.C. (the Speaker's Counsel), remarked that it must not be taken that the drafting of the clause met with the approval of the Committee. The expression "during the continuance of the present war" was very vague; but as it had already been used in other legislation referring to the war, he had adopted it for this clause, although it would have to be defined at some future date.

SKEGNESS GAS BILL.

HOUSE OF COMMONS COMMITTEE.—Thursday, March 4.

(*Before Sir* W. Howell Davies, *Chairman, Mr.* James Mason, *Mr.* Tyson Wilson, *and Mr.* Prothero.)

This Bill is promoted for the purpose of enabling the Skegness Urban District Council to acquire the undertaking of the Skegness Gas Company.

Mr. Wedderburn, K.C., and Mr. G. W. Bailey appeared for the promoters; while the only petitioners against the Bill—the Skegness Gas Company—were represented by Mr. G. J. Talbot, K.C., and Mr. F. N. Keen.

Before the consideration of the Bill was commenced, the Committee-room was cleared, as the Committee desired to confer with Mr. Moon, K.C., the Speaker's Counsel.

Upon readmission of the parties,

The Chairman said the Committee had desired to confer with the Speaker's Counsel with reference to a clause which the Treasury will insist upon in all Private Bills. This clause, which the Committee would require inserted in the Skegness Bill, read as follows:

> Notwithstanding anything in this Act, the Skegness Urban District Council shall not, under the powers of this Act, raise or borrow any money during the continuance of the present war, and twelvemonths thereafter, unless the consent of the Treasury has been previously obtained.

Mr. Wedderburn said he had heard that there had been an intimation from the Treasury that a clause to this effect should be put in the Bill. Proceeding with the opening of the Bill, he said it gave effect to a decision of a Committee of the House of Commons last year presided over by one of the members of the present Committee (Mr. Mason), and there was no preamble opposition. The Bill enabled the Skegness Urban District Council to purchase the undertaking of the Skegness Gas Company. He did not wish to go over the strenuous fight which took place in Parliament last year; but there had been a great many complaints of the Company and the gas supply; and it was fairly clear that it was to the advantage of the town to own the undertaking. Consequently the Council promoted a Bill last session with this object in view; the Company applying at the same time for statutory powers, &c. In the House of Lords the Council did not apparently meet with much sympathy, and their Bill was rejected. But when the Company's Bill came before the House of Commons, both a purchase and a sterilization clause were inserted, in order to prevent the value of the undertaking being enhanced pending purchase by the Council. The aphorism of the Company seemed to be "shareholders first, consumers afterwards;" and the House of Commons granted all that the Council asked. Since then the Directors had done their best to influence the people; and statements had been made at the ratepayers' meeting and a poll demanded.

Mr. Talbot: If you make all these controversial statements, I will have to get up and say they are not true.

Mr. Wedderburn then formally proved the preamble of the Bill through the Chairman of the Council.

The first important matter on clauses between the Council and the Company related to sub-section (3) of clause 5 which reads as follows;

> In addition to the purchase price or consideration, the Council shall pay to the Company the taxed costs, charges, and expenses of procuring any amendment of the Bill for this Act and of and incident to the transfer of the undertaking, and the reasonable costs of the winding-up of the Company, not exceeding the sum of £100.

Mr. Talbot desired to make it clear that the £100 only covered the winding-up of the Company, and that the sum in question did not cover the whole of the clause. This was agreed to by the promoters; the words "such last mentioned costs" being inserted before the words "not exceeding the sum of £100."

Mr. Talbot next brought up a suggested addition to clause 5, to provide for the payment by the Council of compensation to the Directors. He proposed that the sum of £1000 should be so paid for loss of office, and that if this figure were objected to it should be left to arbitration. Apparently, however, there was an objection to the principle. He explained that there were five Directors, each in receipt of £20 per annum, and submitted that all precedent was in favour of compensation. It was true there were certain cases in which Parliament had not thought fit to grant compensation; but there were two important cases in which the principle had been established, both of which were the subject of consideration by special tribunals. The first was the Metropolis Water Act of 1902, which constituted the Metropolitan Water Board for taking over the London Water Companies. By section 48 of the Act it was provided that the Water Board should pay compensation to the Directors for loss of office of an amount to be agreed upon, or, failing agreement, to be determined by an arbitrator appointed by the Local Government Board. The decision was given by a Joint Committee of both Houses of Parliament. Again, in the Port of London Act, 1908, large sums were provided for by way of compensation to the Directors of the Companies. He submitted that on the plain principle of justice, compensation should be paid in the present case. He rather gathered from Mr. Wedderburn's remarks that he did not think the Directors were entitled to compensation in respect of their loss of income, because they had mismanaged the undertaking. He did not want to go into this; but in substance he might say that the result of the so-called gross mismanagement—and every conceivable topic had been used to reflect upon these unfortunate gentlemen in the town, and had also been raked up before the Parliamentary Committee last year—was that, in a comparatively short period, they had reduced the price of gas by 2s., and paid a handsome dividend to the shareholders. If this was gross mismanagement, one might almost wish that there was a little more of it. Probably the most serious of the charges was that the Directors had been too indulgent to the Manager formerly in their employ, who undoubtedly was not a very competent officer, and who certainly appeared to become more incompetent during the latter years. The Directors would have done well to have got rid of him before; but it was not for the Committee now to go into all these matters. He suggested that, on the plain principle of justice, compensation should be granted to the Directors.

Mr. Wedderburn said he would urge very little now about the mismanagement of the Directors, because the whole of the case was within the knowledge of one of the members of the Committee; but he was entitled to say that, since the last session, the Directors had done nothing to get the sympathy of any tribunal before whom they came, because the Town Council had been put to a great deal of trouble through the Directors trying to get at the ratepayers and stir them up against the purchase. They also demanded a poll which put the town to expense. He preferred, however, to deal with the matter upon the question of precedent; and there was no precedent whatever for what Mr. Talbot had now suggested. The two cases put forward in favour of the argument had never been quoted before in support of such a proposal as this. The reason why compensation was granted then was that to act as a director of such huge concerns constituted the sole work of a director—in fact, it was a profession; and therefore, as the director's professions in those cases were taken away, compensation was

granted. In this case the work of the Directors was a sort of occasional supervision, for which £20 a year was paid; and the application could not be supported by any precedent of the kind.

Mr. TALBOT reminded the Committee that there are Local Acts in which compensation had been given by agreement—in fact, there were precedents both ways.

The CHAIRMAN: We will not allow the clause.

Mr. TALBOT next raised the question of compensation to officers and servants of the Company not taken over by the Council. In this case, there was an enormous balance of precedent in favour of his proposal, and he could quote a very long list of cases. It would be enough, however, to say, perhaps, that in the Skegness Urban District Council Bill last year, which proposed to purchase the Company, but which was rejected by the House of Lords, a clause was inserted by the Council in which compensation was to be paid to the officers and servants, notwithstanding the fact that the purchase was proposed on the ground of mismanagement of the Company. The clause in that Bill was identical with what he asked the Committee now to put in.

Mr. WEDDERBURN said there were precedents both ways in this matter. In Porthcawl last year a similar application was refused. Any officer who was doing his work well like Mr. Salmon, the present Manager, would, he should imagine, be taken over by the Council; but he would ask the Committee to consider who the other officers were. There was a Secretary, Mr. Page, a member of a firm of solicitors in Lincoln, who occasionally came to visit the Gas Company's offices. The only effect upon him was that, like a great many other solicitors who changed their clients, he would lose a client; and he should not be compensated. There was also a Consulting Engineer, Mr. Brockway; he was not a whole-time servant. And the same thing applied to the Auditor. The one person to be considered was Mr. Salmon, who was engaged as Manager in 1912, and who, as the Council admitted in Parliament last year, had done his work exceedingly well. Consequently he maintained there was no ground whatever for compensating the officers, and putting a charge on the ratepayers in the district.

Mr. TALBOT said Mr. Wedderburn's argument had merely gone to the question of the amount of compensation. The part-time officers who did their work for a comparatively small fee would, of course, get very much less from an arbitrator than a whole-time officer.

Mr. WEDDERBURN, in reply to the CHAIRMAN, said there were three whole-time men—Mr. Salmon, the manager, Mr. Mather, the collector, and Mr. Bark, the assistant collector.

The CHAIRMAN said that the Committee had already ruled-out the Directors, and now thought that provision should be made in the Bill for compensation only to the three whole-time officers, should they not be taken over.

Mr. TALBOT then referred to clause 9, which provides for the maintenance of the undertaking by the Company until the transfer. This prevents the Company from raising any further capital or entering into any contract or agreement (except such as shall be necessary for the conduct of the business), without the consent of the Council. Under sub-section 3 of section 87 of the Skegness Company's Act last year, the Company were entitled to borrow money during the promotion of the purchase Bill. He was afraid it might be argued that the Company would have no power to borrow once the present purchase Bill passed through Parliament. It was possible, however, that it would be some time under the Treasury clause before the actual transfer would take place. Therefore he asked that there should be an addition to clause 9, making it clear that the Company may borrow money without the consent of the Council, but not raise fresh capital, pending the actual transfer.

The CHAIRMAN asked Mr. Wedderburn what the position would be, as things stood at present, should the Company require money for carrying on the working, and the purchase not take place for some eighteen months.

Mr. WEDDERBURN said the Company could raise fresh capital with the consent of the Council.

Mr. TALBOT maintained that this was going beyond the Bill of last year.

The CHAIRMAN said the Committee thought Mr. Talbot's suggested amendment was required.

This completed the contentious matters between the Council and the Company.

Mr. WEDDERBURN next drew the attention of the Committee to the fact that the maximum price now proposed by the Council was 4s. 3d., whereas the Company's standard price was 3s. 6d.

Mr. *Frank H. Jones*, called to explain the position with regard to this matter, reminded the Committee that whereas a 3s. 6d. standard price could be raised very considerably if the Company were content to reduce their dividends, the maximum price in the case of a Council could not be increased. It was a common practice to have a high maximum price. The average of six local authorities in Lincolnshire was 4s. At the same time, although the City of Lincoln had a maximum price of 4s., the actual selling price was only 2s. There was no danger at all in allowing a high maximum price.

The Committee agreed.

Mr. WEDDERBURN also called attention to clause 22, which raised an important question as between the Council and the Local Government Board regarding the number of years during which the money borrowed for purchasing the undertaking should be repaid. It was proposed in the Bill that the period should be forty years. The report of the Local Government Board submitted that the period should be thirty-five years. Although this was the usual period granted, the real position to some extent had been altered by the war. The point was that, owing to the present financial stress, it was desirable to deal as gently as possible with ratepayers and to spread any debt over as long a period as possible in order that the rates might weigh as lightly as possible on the community. As regards the length of life of the plant, he would ask Mr. Jones to give evidence.

Witness said that the works at Skegness were in fairly good order; and if the necessary sums were spent upon them in upkeep, there was no reason why they should not have a life of considerably over forty years. There were miles of mains in various parts of the country much older than forty years. The only things which depreciated at all quickly were meters and stoves.

The CHAIRMAN remarked that the Council would not buy new plant, and it was a question as to whether the Committee would be justified in giving as long a period for what was practically second-hand plant as for new plant.

Mr. WEDDERBURN submitted that forty years would easily represent the life of the greater part of the undertaking.

Witness said that the perishable part of the undertaking, apart from the land and buildings—namely, meters and stoves and houses—represented a quarter of the total, the mains and pipes would represent another quarter, land one-eighth, and the buildings and plant the balance. There were many retort-houses in London more than forty years old, which were as good to-day as when put in.

The CHAIRMAN announced that the Committee would only allow thirty-five years, as recommended by the Local Government Board.

A special clause was inserted in favour of the Great Northern Railway Company, giving an option to purchase a strip of land at the side of the gas-works in the event of the Company ever desiring to widen their lines.

The clause suggested by the Treasury was subsequently inserted, with one or two necessary drafting alterations in other clauses; and the Bill was ordered to be reported for third reading.

LEGAL INTELLIGENCE.

RIGHT TO LAY A WATER-MAIN UNDER A RAILWAY.

In the Court of Appeal last Wednesday, Lords Justices Swinfen Eady and Bankes and Mr. Justice Bray heard an appeal on behalf of the London, Brighton, and South Coast Railway Company from an order made by Mr. Justice Shearman, in the matter of an arbitration between them and the Metropolitan Water Board. [See "JOURNAL" for May 26, 1914, p. 588.] His Lordship made the order on a special case stated by the Arbitrator, that the Board were entitled, under the powers conferred upon them by their Act of 1907—the Metropolitan Water Board (Various Powers) Act—to lay a pipe through and under the lands of the Company without purchasing or acquiring any easement or right of constructing and maintaining works on, through, in, under, or along such lands. By section 61, sub-section 1, of the Act, the Board were empowered to exercise, at any place within their limits, such powers with respect to the laying of mains and pipes as were exercisable by local authorities under the provisions of the Public Health Act, 1875, with respect to the laying of mains and pipes within their respective districts for the purpose of water supply. By sub-section 3, the limits of supply were to be deemed the district of the Board. By section 96, sub-section 6, the Board could not, without the consent in writing of certain specified railway companies, under their common seal, acquire any of their lands or property; but they might acquire, and the companies should, if requested, grant to them, an easement or right of constructing and maintaining works on or under such lands or property; and the sum to be paid for such easement or right was to be settled by arbitration. The Board having laid a main under the land of the appellant Company, the Arbitrator held that they were not bound to acquire or pay for any easement or right of constructing or maintaining the main; and this view was upheld by Mr. Justice Shearman.

The case for the appellants was submitted by Mr. W. Ryde, K.C., and Mr. Cyril Hartree; Mr. Clavell Salter, K.C., and Mr. Courthope-Munroe, K.C., appearing for the respondents. Without calling on the latter counsel, their Lordships said they thought the learned Judge in the Court below was right in the conclusion at which he arrived; and they dismissed the appeal with costs.

Ilkeston Gas Undertaking.

Despite the fact that the sale of gas during the past year had not realized anticipations, and that there was a largely increased cost for coal to be met, it was reported at a meeting of the Ilkeston Town Council last Tuesday that it was the intention of the Gas Committee to hand over £2500 in relief of the district rate; this still leaving them with £4470 to their credit, in addition to the renewal and reserve funds. The Mayor (Mr. J. A. Macdonald), who is Chairman of the Committee, in dealing with the work of the past year and the estimates as to prospective operations, said sales had not been in keeping with anticipations, for the simple reason that they had been badly hit in connection with the lace trade depression. Out of 6148 customers, 4900 used prepayment meters; and there was no doubt that rigid economy was now being practised in regard to gas consumption. Their losses by leakage had, he regretted to say, been enormous; but steps were being taken to remedy this defect. He was glad to be able to report that the gas-works were in a splendid state, and that the management was excellent. Mr. J. E. Holt (their Manager) was an able man, who, in very difficult circumstances, had met the situation well. He hoped it would go forth that the gas concern was well managed and controlled, and did not supply bad gas, buy bad coal, or sell bad residuals. Mr. E. Smith pointed out that the gross profit upon the year's trading was £2579 less than it was three years ago, which was the last year in which Mr. Humphrys was Manager. Mr. W. Smith said there were hundreds of persons who were dissatisfied with the quality of the gas. As to coke, he knew people who obtained it from Nottingham, because it was better.

Dearer Gas at Faversham.—Dividends of 5 per cent. on the original stock and 3½ per cent. on the new ordinary stock were declared at the annual meeting of the Faversham Gas Company. This reduction of the dividend, it was explained, was due to abnormal expenditure out of revenue coinciding with the greatly increased cost of production due to the war. The Directors' decision to raise the price of gas from 3s. 4d. to 3s. 9d. per 1000 cubic feet, as from the 1st prox., was intimated.

MISCELLANEOUS NEWS.

LEA BRIDGE DISTRICT GAS COMPANY.

The Ordinary Half-Yearly General Meeting of this Company was held last Tuesday, at the Offices, Nos. 63 and 64, Chancery Lane, W.C.—Mr. A. M. PADDON, M.Inst.C.E., in the chair.

The SECRETARY (Mr. Richard Sandell) read the notice convening the meeting; and the report and accounts were taken as read.

The CHAIRMAN, in moving the adoption of the report and accounts, said these would have assured the proprietors as to the satisfactory increase in the Company's business in the half year ended December. This increase would have been considerably greater, but for the fact that they had had the hours of lighting substantially restricted in their distributive area; and as they did a great deal of the public lighting, this had affected them adversely. A good many companies, they all knew, had been arbitrarily deprived of the public lighting, by reason of the fact that the local authority were in charge of electricity works. The Lea Bridge Gas Company, however, still had, in ordinary times, a considerable amount of the public illumination; and to this extent they suffered by the Government restrictions which were in force.

FIGURES FROM THE ACCOUNTS.

Going to the accounts, it would be seen that there was still some margin as to the issue of further capital, though this was getting small in amount. At the close of the year, there were £14,500 of ordinary stock and nearly £18,000 of loan capital remaining to be issued, when time and circumstances might lend themselves to this purpose. From the capital account, it would be noticed there had been spent during the half year £25,515; but this sum was reduced by £2729, representing what had been written-off by way of depreciation. This, of course, was an important expenditure; but they were now re-constituting the whole of their works—abandoning a carbonizing process that had become an anachronism, although it was very good at the time it was adopted, and bringing things up to date in every technical and practical way. In spite of the fact that a great deal of this work had been done and paid for, the capital to-day only stood at £608 per million cubic feet. This was not a very high figure in connection with a company of their size, who were now looking forward to getting the immediate benefit of important capital expenditure. Turning to the credit side of the revenue account, he might remark that there had been obtained from the sale of gas £74 in excess of the amount brought to book a year ago; but it had to be remembered that gas was now being sold at 2s. 11d. per 1000 cubic feet, as compared with 3s. then, which represented a difference of nearly £1000. They had therefore made up this debit and gone ahead to the trifling extent he had indicated. From the rental of meters and stoves there had been received £469 more in the last six months—not an important figure in its intrinsic amount, but in reality very important, because any progress in this way meant that they had put out all the implements conditional to an extended supply of gas in the future. Wherever a shareholder saw anything like an increase in the receipts from rentals of meters and stoves, it was a sure augury of a satisfactory growth of business in time to come. With regard to residual products, they were £390 behind; but they were not so badly off in this respect as some other companies. However, as he had pointed out, the total increase for gas and fittings was £543; so that they were on the right side comparing these two figures.

SOME WORKING RESULTS.

Referring for a moment to the working, he might say that the gas sold per ton amounted to 12,252 cubic feet, which was quite as good a result as it was possible to obtain from the present manufacturing system. They did, however, look to improve very materially upon this figure when the new plant came into action, which it was hoped would be about the end of the present month. From that time forward substantial economies might be anticipated to set against the very many increases of expenditure with which they were being threatened. The unaccounted-for gas, at 8·7 per cent., was larger in its *primâ facie* aspect than one might like to report to proprietors; but it included gas used on works and at show-rooms. As they used gas on the works for motive power for engines, and as perhaps they were a little extravagant at the show-rooms, so as to recommend the advantages of gas to the public, these two facts materially qualified the figure; and reduced to a common basis of comparison with other companies, he thought their percentage of unaccounted-for gas would be somewhere about 5½ per cent., which was a normal figure.

PROVISION FOR DEPRECIATION.

Glancing at the debit side of the revenue account, carbonizing wages, reduced to a convenient term of comparison, amounted to just over 2d. per 1000 cubic feet; and in this direction economies might be anticipated in the statements which the Board hoped to present in the future. There would be considerable saving on this head. The next items to note were repairs and maintenance of works and plant, and mains, service-pipes, &c., and repairing, renewing, and refixing meters, stoves, and fittings, which between them represented the provision made for depreciation before anything like profit was approached. The aggregate of these items amounted to 12·63d. per 1000 cubic feet; and this should assure those of them who were familiar with gas accounts that the profit, whatever it might be declared, was a strictly safe and sound one, only reached by the fullest possible measure of precaution. It must be well known to most of those present that the profit as shown in the revenue account was very much what a Board might like to make it. By cutting things fine, by limiting depreciation, by carrying to capital matters which could quite legitimately be so treated, one could show a good profit; but it was not good administration, and the immediate consequence was that one did not get from the revenue account a proper amount of working capital to carry on the concern. And for as long as this process of curtailment was adopted, one was adding to the capital account without adding to the assets of the Company—simply to permit of the carrying on of the business. This was the principle with most of the very large gas companies of the kingdom; but it should be a warning to deter, not an example to emulate. The Board of the Lea Bridge Company would, so long as the proprietors allowed them, maintain their present policy, which made for the lowering of the capital and a general increase in the efficiency of their business methods.

UNUSUAL AND ABNORMAL CHARGES.

It would be noticed that there had been an accretion in recent years of unusual and abnormal charges, which some time ago they did not have. There were, for instance, the benefit fund and the National Health Insurance items. The last-named, the Government were responsible for; but the next two items the Company owed to their own initiative, and he felt sure they would strongly recommend themselves to the proprietors. The first was a contribution of £315 to the Prince of Wales's National Relief Fund, and the other was a sum of £355 representing payments to dependants of men on war service. He did not think anyone would say that payments such as these had nothing to do with the objects of gas companies; for a gas company was dependent upon the existence of the kingdom, and these were payments which were concerned closely with this question. If it were now out of the doubtful stage, six months ago it was a very serious question with all of them.

RESERVES ON DEPOSIT.

Turning to the profit and loss account, there was brought in an amount of £5581, and there was carried forward £5952; so that the net result of this period of stress and difficulty was that they were £370 better off than they were before, notwithstanding these abnormal disbursements and the very liberal apportionments in the way of depreciation. Nothing had been added to the reserve fund in respect of this half year, partly because it already stood at a very ample figure, and partly because, in the judgment of the Board, these were not days in which to further supplement such a fund. If they were able to exist without drawing from what was already set aside, it was matter for congratulation. And there was always this about a reserve fund—that whatever was done, it was impossible to please everybody. There was £3500 in the insurance fund, which they could take if they required it; but fortunately they had not had to do so. He said "fortunately" because, although these funds were invested punctiliously according to statutory directions—that was, in trustee securities—such securities were not easily manipulated in these days, and could only be realized at a great sacrifice. The point had occurred to him whether, in dealing with things of this kind, it would not be wise and politic to stretch the technical meaning of the Act, and keep a certain portion of the money on deposit in a bank. Of course, quite separate, as belonging to the proprietors. This might not technically comply with the requirements of the Act; but the funds would be in a vastly more useful and valuable form than as they were now—entirely locked up in trustee securities. However, by the time they were in a position to make such an alteration, he sincerely hoped the reason for it would have passed away, or at all events have been modified. The benefit fund account was a satisfactory feature. It showed that they required in order to fulfil their understanding with the men during the past six months only £45 10s.; whereas they had taken from revenue £118, which was much less than they were entitled to take under the Act. It was, in fact, ½d. per 1000 cubic feet; while they were empowered to take ¾d. Thus the situation was well in hand. While this benefit fund had enabled them to set up, at a very crucial time, a good understanding with their men, the cost to the Company was nothing like so important as the result which had been achieved by so dealing with the employees.

THE COAL POSITION AND THE FUTURE.

The only other matter arising out of the accounts to call for comment was the question of coal. It would be seen that on Dec. 31 there was in store 232 tons; but they were not so neglectful as all that. There was a good deal more; but this was a fault that he did not think a Board ever need quarrel with their Engineer about. With regard to the future, the case of this Company was much as that of other gas companies. They were to some extent dependent upon sea-borne coal; and thus far their position was precarious. But they were fortunate enough to have an alternate supply from Yorkshire, of which they had already largely availed themselves, and with regard to which they had made very complete provision for the future. The price, of course, had been immensely increased; but these were not times in which one could pick and choose as to prices and conditions of supply. What had to be studied was security and the maintenance of the Company in a position to discharge its statutory obligations; and this the Directors had done as far as possible. They had a good supply of oil, which was secured to them up to 1916; so that they could not be accused of not having exercised forethought in this direction. This would prove a very great asset to them in the times through which they were passing. The business, in spite of limitations, was growing steadily; and, speaking generally, the position of the Company was eminently preferable to that of many others with which he was acquainted. No body of proprietors were better entitled to have confidence than they were. This was the first time they had met in their new offices. The Company saved £120 a year by the change; and the accommodation was at any rate quite as good.

Mr. G. W. CAREY seconded the resolution, which was put to the meeting and carried unanimously, without comment.

On the proposition of the CHAIRMAN, seconded by Mr. A. F. PHILLIPS dividends were declared at the rates of 5 per cent. per annum on the preference stock and 6½ per cent. per annum on the consolidated ordinary stock, both less income-tax.

Mr. CAREY, in proposing the re-election of Mr. Paddon as a Director, remarked that he possessed a thorough practical and technical knowledge of all details connected with gas manufacture; and his association with the Parliamentary Bar brought him constantly into contact with parliamentary practice as affecting gas companies. They saw in the accounts presented from time to time the result of his guiding hand

as Chairman; but the Board had opportunities of studying the excellent and tactful methods by which these results were obtained.

Mr. PHILLIPS seconded the motion, which was agreed to.

Then, on the proposition of Mr. WILLIAM RICHARDS, seconded by Mr. JOHNSON, Mr. Thomas Maskall was re-appointed one of the Auditors.

Mr. MASKALL, in acknowledging his re-election, referred to the suggestion of the Chairman that it would be well to put some small portion of the reserve fund on deposit. He said he did not know whether the Company would be legally entitled to put money on deposit and call it an investment; but, if so, he was absolutely in favour of such a course. He did not think the prices of gilt-edged securities were going to be maintained over the next few years even at what they were now.

THE PART OF THE WORKER AND THE CAPITALISTS' DUTY.

The CHAIRMAN then moved a vote of thanks to the Engineer, Secretary, and staff generally. He said they had always deserved this vote; but they did so in an even greater degree than usual on this occasion, for they had been through a very anxious time indeed. He was assured that the load had been shared by everyone, from the top to the bottom, of those in the Company's employ. The burden of the war itself had pressed heavily on their men; and no less than 33 per cent. of the employees were defending their country at the present time. This was a very high percentage; and he could tell them something which he thought was as true to-day as he knew it was a few weeks ago—that every man in the Company who complied with the requirements of his country had responded to the call, and was now with the Colours. ["Hear, hear."] The Company, on their part, had tried to lighten as much as they could the burden and distress which were inseparably attached to such an act of devotion. The departure of these men from their sphere of labour was, of course, an added burden to those left behind; and it had been supported very nobly by the men. In a war like this, there was a great display of national character; and while there was much of it they could all be honestly proud of, there were, as must be expected of human nature, certain details of which they were not so proud. They had read in the papers of labour troubles on the Clyde, of which they were ashamed; but they must not fall into the error of laying all the blame for these on the men. It would not be fair to do so. They could all bear witness to the great devotion the working man had shown to his country through this time of crisis. There had been in the Press reference to an incident in connection with the Epsom Grand Stand which was every bit as disgraceful in its way as anything which had happened on the Clyde; and at the same time that many men in humble circumstances were sacrificing all they could, there was an uncomfortable feeling that certain industrial and commercial elements were making large fortunes out of their country's misfortunes. "I refer," continued Mr. Paddon, "to two things. I was told the other day that the freight from the North to London went up to 17s. 6d. per ton. This simply means that the price of the ship must have been realized within a very few days. Now, you know, that is literally tearing the flesh from the breast of your country at the time of her extremity. Similarly, we hear coal has gone to over 14s. per ton at the pit's mouth. The profits attaching to this must be stupendous. So when we hear querulous remarks about the deportment of Labour, let us remember they have had a very bad example set them in certain directions; and we can congratulate ourselves that they have been so limited in the extent to which they have availed themselves of it." He wanted on this occasion to empower Mr. Cross to tell his men—and the same remark applied to Mr. Sandell—that the Board and the proprietors thoroughly appreciated their devotion to the Company's service during these troublous times. He would like those who had joined the forces to know how much their sacrifice was appreciated, and those who had been left behind to understand that their extra labours had not passed unnoticed.

Mr. GISBURNE seconded the proposal, which was heartily agreed to.

Mr. SANDELL, in returning thanks, said he had certainly just spent a most anxious time in the service of the Company.

Mr. CROSS remarked that the workmen of Lea Bridge, taking them as a whole, were very loyal. They deserved everything that had been said of them. He might say that the Company were doing something now for the benefit of their men, in the way of granting a bonus to those who needed it most. Those who had mouths to feed would feel the effect of the high prices of food; and they were being considered, for their loyalty. He had no doubt the men would at a later period express their gratitude to the Directors for what they had done. There was one point in the Chairman's speech to which he wished to refer—the question of leakage, which touched the Engineer. [Laughter.] The Chairman mentioned that the leakage was 8·7 per cent., and gave an explanation of this. But there was still another reason. At Lea Bridge they used, as elsewhere, prepayment meters; and it was generally known that with these there was a difference between the summer and winter. There was more money being held up in slot-meters at December than there was at June; and the consequence was that there was apparently a greater percentage of leakage, or unaccounted-for gas, at Christmas than at Midsummer. He thought the figure for June last was 2·68 per cent., as against the figure of 8·7 per cent. for Christmas; and if these two figures were averaged, they would arrive at the correct unaccounted-for gas for the year.

Before the meeting separated, a cordial vote of thanks was, on the proposal of Mr. GISBURNE, seconded by Mr. E. L. BURTON, passed to the Chairman and Directors.

HASTINGS AND ST. LEONARDS GAS COMPANY.

At the Meeting of the Company last Thursday, there was presented the 122nd half-yearly report, which stated that the accounts showed a profit balance of £11,309, which, together with £121 transferred from the insurance fund towards the war risk on coal, and £583 from the balance brought forward, was sufficient to meet the dividends. Following the outbreak of war, the half year ended Dec. 31 was one of exceptional gravity. The supply of contract coal practically ceased; the market for residuals, more particularly tar and ammoniacal liquor, was suspended; the cost of nearly all materials and stores had increased considerably; and, owing to the call to active service, it had been necessary to carry on the Company's business with a considerably reduced staff. Having regard to these difficulties, it was a matter of congratulation for proprietors and consumers that it had been possible to maintain the supply of gas unimpaired throughout the half year. Up to the end of the year, 24 of the Company's employees had gone on naval or military service; and regard was being had to the interests of such employees and their dependants. The Directors recommended dividends at the full statutory rates of 6½ per cent. per annum on the 5 per cent. converted stock, 5 per cent. on the 3½ per cent. converted stock, and £6 1s. per cent. on the 5 per cent. additional stock—all less income-tax.

The CHAIRMAN (Dr. G. G. Gray, J.P.) said that the total extinction of outside lighting of shops and places of amusement in the town, and the restriction of lighting in other respects on account of the contracted hours of business, and of economy, to say nothing of the mild winter and of loss of season, could have no other effect than materially to influence the amount of gas sold and consumed. Coal had been unattainable, or attainable with great difficulty. They had gone for as long as two months without obtaining seaborne coal. The Government commandeered ships, among which were those that had been in the habit of supplying the Company with coal; and when they succeeded in getting ships, they found their harbour closed against them. When, after considerable negotiations, they succeeded in getting a harbour and a berth allotted, they found that men and machinery were not obtainable, because these were required for Government use. The freighters naturally objected, in addition to running war risks, to have the delay through being unable to unload. One result was increased cost. Insurance for war risks was as much as 3s. per ton of coal; and the extra cost of transport was in round figures 9s. per ton—equivalent to 8d. per 1000 cubic feet of gas made. The natural result was to throw further transport on the railway, and make railway traffic still further congested. Extra freightage had cost them over £600. From their residuals they received a much diminished return. With these difficulties, it was with considerable satisfaction they found that the profits were only £839 less than for the corresponding half year. Report after report of other companies showed that their deficiencies ran into thousands of pounds. Apart from war effects, the business was as sound and satisfactory as ever. They had sold 100 more gas-stoves, and let out many more. They had now 28 of their employees in the service. The principle upon which they had acted was that the dependants should not suffer through the patriotism of those who had gone; and as far as possible the places were kept open. They had the great advantage of Mrs. Botley's service in carrying out the work; and it must be very gratifying to her, as it had been a pleasure to him, to read letters written home by men at the front, showing the appreciation, not only of the dependants, but of the men, of the services rendered by Mrs. Botley. Some companies at the very commencement of the war raised the price of gas; while others had since done so. The Directors and management had most carefully considered the subject. It was quite possible that they committed a technical error of judgment in not having previously raised the price; but they did not wish—acting, as they believed, in the interests, not only of the stockholder and consumer, but also of the town generally—to raise the price of gas unless it was unavoidable. The time had now come when, in the general interest, it would be inevitable that the price of gas should be raised; and it would be raised as from the next reading of the meters. But it would not be raised more than was absolutely necessary, and would be put down as soon it was possible.

The report and balance-sheet were adopted; and the Chairman, Directors, and staff were thanked.

Mr. BOTLEY, responding for the staff, mentioned that they had representatives practically throughout the world; and that those representatives kept up their interest in the work. He was accumulating a mass of information in regard to gas lighting from India, the fighting line, Egypt, and the North Sea.

TYNEMOUTH GAS COMPANY.

The Forty-Ninth Annual General Meeting of the Company was held last Thursday—Mr. J. B. WILLIAMSON, J.P., presiding.

The CHAIRMAN, in moving the adoption of the report and accounts, said that, as a consequence of the war, the year under review had been one of great events; and naturally the Company, in common with other gas companies, had experienced considerable anxiety. Of their men, 45 (including Mr. Duncan, the Works Chemist) had joined the Colours. They had not been allowed to suffer financially. The Directors thought it right to contribute 100 guineas to the Prince of Wales's National Relief Fund out of the profits; and they were sure the shareholders would endorse their action. What immediately concerned them was the loss of revenue caused by the serious drop in the price of residuals. This was mainly brought about by lack of buyers on the Continent, who, in ordinary times, used large quantities of their coke. Then restrictions had been placed upon the lighting of the streets in the borough and the outside area of supply. A large number of lamps remained unlighted; and the outside illumination of shops and public buildings had been much reduced. Public-houses were closed two hours earlier; and, speaking generally, consumers of gas were going to bed earlier, and were consequently using less light and heat. By reason of all this, it would naturally be expected that the quantity of gas consumed should have fallen seriously. Fortunately, this was not the case, because they made nearly 18 million cubic feet more gas last year than in 1913, equal to an increase of 3·18 per cent., and representing roughly £1800 in cash. This good result had been attained with a considerable reduction in the quantity of coal carbonized; for they had actually used 68 tons less coal during the year. The shareholders would be glad to know that the rate of increase in gas made had been fully maintained during January and February of the present year. During the past year 49,674 tons of coal had been

carbonized; and from it 580,000,000 cubic feet of gas had been made. This gave a yield per ton of 11,683 cubic feet, against 11,300 cubic feet in 1913. Having referred to the make and disposal of residuals, and remarked that the working results had been excellent, the Chairman said the number of gas consumers had increased by 2·20 per cent.; gas-cookers in use by 3·75 per cent.; and gas-fires and other heating appliances by 27 80 per cent. The receipts amounted to £90,753 and the expenditure to £79,689, leaving a balance of £11,064 as profit on the year's working. It had again been necessary to draw on the balance of profit from the previous year to the extent of £821 to meet the dividend. All materials had cost very much more; and a considerable increase in wages was paid during the year.

The report was adopted, and dividends for the past half year were declared at the rates per annum of 4 per cent. on the preference stock and 5 per cent. on the consolidated and new ordinary stock.

BARNET DISTRICT GAS AND WATER COMPANY.

Satisfactory Position Maintained.

The Half-Yearly Meeting of the Company was held on Feb 25, at the Holborn Restaurant, W.C.—Mr. A. F. PHILLIPS, M.Inst.C.E., the Chairman, presiding.

The SECRETARY (Mr. Ernest W. Drew, F.C.A.) read the notice convening the meeting; and the Directors' report and the statement of accounts were taken as read.

The CHAIRMAN, on rising to address the shareholders, said he was sure they would all share with the Directors the expression of regret at the great loss the Company had sustained in the death of their late Chairman, Mr. Alfred H. Baynes. He had been a member of the Board for 26 years, and Chairman for the past nine years. It had been his (the speaker's) pleasure to know and be associated with Mr. Baynes for many years in several affairs; and he looked back upon him, and remembered him as a man of great energy, a skilled accountant, able to detect a flaw in any undertaking, and feeling the greatest pleasure in appreciating any improvement. He was devoted to everything he undertook; and in the position he occupied in their Company, he never spared himself. He did all he possibly could to promote its interests. They all deplored the loss of so estimable a man. His colleagues had done him (Mr. Phillips) the honour to select him to follow Mr. Baynes, and had appointed him Chairman; and he could only say that while he occupied this position, it would be his earnest endeavour to do everything he could for the Company. To the vacant seat on the Board, the Directors had elected Mr. J. E. Plummer. He had been a considerable proprietor for many years; and it was felt that he had experience, especially in connection with water-works, which would be serviceable to the Board. Proceeding to move the adoption of the report and accounts, the Chairman remarked that it would be noticed that no new capital had been raised in the period under review. In the gas department, there had been an expenditure of £628 on new mains; and for water, the only expenditure was £32 deposit on some land acquired at Colney Heath, and £142 on mains and service-pipes. Reviewing, first of all, the gas portion of the undertaking, he might say that the gas sold during the half year was a little over 98 million cubic feet, or 1·7 per cent. more than in the corresponding period of the previous year, which was satisfactory, considering the restrictions which had been placed on outdoor lighting, and the fact that the Company's gas district was not of rapid development. The working had been most efficient; for, while 3 million cubic feet more gas were made, 187 tons less coal had been carbonized. There was 13,300 cubic feet of coal gas per ton of coal brought into charge. In the gas revenue account, the cost of coal and oil was about the same as in the corresponding period. Wages and gratuities at works were £180 less, due to the introduction of charging machinery; and repairs were £361 less. Repairs and renewals of mains were also £419 less; and £292 less was spent on stoves and fittings. Public lamps cost £322 more; for the Company had to make additions to the public lighting plant to secure a five-years' contract. All other expenses remained much the same as in the previous year; the resulting profit being £4745, as compared with £4780. It had to be remembered that the price of gas was 2d. per 1000 cubic feet less than in the preceding year, which meant £800 for the six months. The receipts for gas were consequently only £15,921, as against £16,283. The residual products had realized £3689, as compared with £4405, which was a more satisfactory result than most companies had obtained for the past half year. The water undertaking was of greater importance than the gas, because the limits of supply were more extensive, and included the populous places of Finchley, Colney Hatch, and Church End. The district had an area of 47 square miles—from Hatfield on the north to Hampstead on the south. The net revenue derived from water being nearly three times that from gas, indicated to the proprietors the value of this part of the business, and how necessary it was to maintain the water supply in a highly efficient state, and beyond the slightest reproach as to quantity or quality. For some years the Company had had anxiety about the future water supply of the district. Two or three pumping works were carried out; but though they met the requirements for the time, they did not afford the assurance for the future which the Directors desired. This assurance was eventually found in the north-west corner of the Company's district; and though the Company had to fight hard to maintain their right to this water, as he mentioned when addressing the proprietors in 1909, they succeeded, and under the supervision of their able Engineer (Mr. F. J. Bancroft) there had been constructed at Colney Heath a very efficient plant capable of meeting the present demands, with capacity for future extensions. The Company had sunk an additional well in the same district, at North Mimms, a test of which had given over a million gallons per day. This was capable of great development. No permanent pumping plant was provided for this work; but immediately the increase of business rendered it advisable, this would be done. It would be evident to the proprietors that every care was taken to provide for the future requirements of the district as regarded water. The quantity supplied to the district in the half year was 412,000,000 gallons. The maximum daily quantity was 3,300,000 gallons; whereas the existing pumping plant, without addition, was equal to raising 4,000,000 gallons per day. The expenditure on maintenance and repairs of the plant for obtaining and storing the water was £1570, as compared with £1706; while on repairs of mains and fittings it was £491, against £986. Pumping charges showed an increase from £2293 last year to £2514, owing to more water having been pumped. Other revenue items showed only slight variation. The water income had increased from £23,437 to £24,622; and the net revenue was £14,978, against £13,133. It would be seen from the profit and loss account that, after transferring £2000 to the contingency fund, and subscribing £115 to the National Relief Fund, there was an available balance of £36,136. The dividends proposed would absorb £13,442, leaving £22,693 to carry forward—an increase of £900 on the amount brought into the accounts. As to the future, it was difficult to forecast what might happen. They were overshadowed by the dreadful war, which affected them seriously. The water undertaking might not suffer to any great extent; but for the gas business it was critical. Coal was not only difficult to obtain, but the cost of it was increasing enormously, and might continue to do so for some time. Labour was hardly obtainable. The Directors would do their best to avoid increasing the price of gas; but the industry was faced with so many uncertainties as to cause the greatest anxiety for the future.

The DEPUTY-CHAIRMAN (Dr. Glaisher) seconded the motion.

Mr. C. P. CROOKENDEN said he had been asked by one or two proprietors who were unable to be present to congratulate the Board upon the state of affairs revealed by the accounts. It was a source of satisfaction to everyone concerned that it had not been necessary to raise the price of gas, as so many companies had had to do. It was very comforting to reflect that, in spite of the difficult times they were passing through, they could still put by £2000, maintain the dividend, and increase the carry-forward.

The resolution was put to the meeting, and unanimously carried.

On the proposition of the CHAIRMAN, seconded by Mr. ALFRED LASS, dividends were declared, less income-tax, for the half year, at the rate per annum of 9 per cent. on the "A" and "C" stocks, 8 per cent. on the "B" stock, and £6 6s. per cent. on the "D" capital gas and water stocks.

The DEPUTY-CHAIRMAN, in proposing the re election as Directors of Mr. Phillips and Mr. Lass, said he would like to take this opportunity of congratulating the Company upon having secured Mr. Phillips as their Chairman; for there was no one who had a more complete and practical knowledge than he had of the manufacture of gas in all its branches. He had been a most valuable member of the Board for some years; and it was a great pleasure to his colleagues to see him occupying the right place as Chairman. As to Mr. Lass, his financial knowledge had been of the utmost assistance to the Company; and there was no instance in which the advice he had given had not turned out to be exactly right.

Mr. J. E. PLUMMER seconded the proposition, which was carried; and thereafter the retiring Auditor (Mr. Crookenden) was also re-appointed.

The CHAIRMAN then proposed a hearty vote of thanks to the officers of the Company. He had, he said, already mentioned that the quantity of gas sold per ton of coal carbonized was 13,300 cubic feet. Going back to 1907, he found the Company were then selling only 9700 feet per ton; but since then there had been a steady improvement, until the present satisfactory result was obtained. At the same time, the receipts from residuals had gone up from 54·79 to 59·69 per cent. of the cost of coal. Though coal had kept on rising, the total working expenses had decreased from 23·1d. to 20·3d. per 1000 cubic feet. Then he might say, with regard to the charging machine, that since its introduction Mr. Bancroft and his competent Assistant had effected such improvements in it that the makers had considered it advisable to acquire them. In the water department, Mr. Bancroft had been equally successful; the pumping-engines erected under his supervision being efficient and economical in working. They were equally indebted to their Secretary for the excellent manner in which the accounts were prepared. In fact, to all the staff the thanks of the proprietors were due for the satisfactory results presented.

Mr. PLUMMER seconded the proposal, which was heartily agreed to.

Mr. DREW and Mr. BANCROFT acknowledged the vote; the latter remarking upon the loyal manner in which he was supported by the staff, in the difficulties occasioned by so many men having joined the Colours.

A vote of thanks was accorded to the Chairman and Directors, on the proposition of Mr. R. L. ANDREWS; and the CHAIRMAN'S reply brought the meeting to a close.

HARROW AND STANMORE GAS COMPANY.

A Fortunate Undertaking.

The Half-Yearly Meeting of the Company was held on Monday last week, at the Holborn Restaurant, High Holborn—Mr. A. F. PHILLIPS in the chair.

The ENGINEER AND SECRETARY (Mr. J. L. Chapman) read the notice convening the meeting; and the Directors' report and the statement of accounts were taken as read.

The CHAIRMAN said that, since the last general meeting, they had lost their highly esteemed colleague and Chairman (Mr. Alfred H. Baynes). The services he gave the Company were efficiently and cheerfully rendered. His judgment was sound, and his consideration for others remarkable. He was a gentleman of the highest integrity, upon whom absolute reliance could be placed. They deeply regretted the loss of such a member of the Board. To the vacant position of Chairman, his colleagues had elected him (Mr. Phillips). He felt there was great responsibility in following such a gentleman as Mr. Baynes. He (the Chairman) did not seek the position; but as his brother Directors were of opinion that it was desirable he should take it, he accepted, and would endeavour, as far as he was able, to consider the best interests of the Company. A far more serious matter was the selection

of the most suitable gentleman to fill the vacancy on the Board. They were a small Board, which was probably the most workable if the members were carefully chosen. They were also getting on in years; and it might not be advisable for him to retain for many years the position he occupied that day. He was of opinion that it was desirable a Director should have some knowledge regarding the business he had to manage. Every year this became more important for a gas company. The cost of coal and other material for producing gas as well as labour was continually increasing, while to meet competition the price of gas had to be reduced. It was necessary therefore to adopt the most efficient means of economizing material and labour. It was consequently advantageous to have some members of the Board who were acquainted with such matters. They desired a gentleman who would comply with these ideals, and be suitable to preside over the Company if required to do so. The Directors came to the conclusion that Mr. Arthur M. Paddon was a most capable gentleman, and they had unanimously elected him. He was the worthy son of a most able gas administrator. In early life, brought up as an engineer, and actively engaged in the management and construction of gas-works, he acquired a thorough technical knowledge of everything connected with the manufacture of gas. Now as a barrister at the Parliamentary Bar, he was thoroughly acquainted with the laws controlling gas supply. As Chairman of other important gas companies, he had shown himself to be a most able administrator. The proprietors might congratulate themselves that he accepted a seat on the Board. During the half year the quantity of gas sold was 160 million cubic feet—an increase of 5 per cent.; and there was an addition of 262 to the number of prepayment and 162 to the number of ordinary consumers. Considering the reduction made in the outdoor lighting under police orders, and the general depression in trade, these results must be regarded as satisfactory. Now turning to the accounts, there had been no capital issued during the half year. There was an expenditure charged to capital of £4977 for new offices, scrubber, tar-extractor, enlargement of water gas plant, mains, meters, and stoves. From this there was deducted £2575 for depreciation, leaving a net addition to capital of £2402 for an increased sale of 7,606,000 cubic feet for the half year, or nearly 5 per cent. on the corresponding half of 1913. As the revenue account gave the amounts for the corresponding half year, it was only necessary to point to those items that required consideration. Coal cost £8804, against £9248. The quantity carbonized was 743 tons less. The Company were fortunate in their contracts. Oil for carburetted water gas, on the other hand, cost £1424, against £981. Some 7938 gallons more were used; and the price was slightly higher. Wages at the works were £918, against £786; the increase including the allowance to the wives and families of those who had enlisted. The expenditure on new prepayment fittings and services was £424, against £1299. The explanation was that the revenue in the half year could not bear the whole cost of fitting-up houses, and a portion of it had to be carried to capital. The fitting work was less in consequence of the number of fitters being reduced by those who had enlisted. The other expenses were much the same as the previous year. On the receipts side, the gas realized £24,876, against £23,803 the previous year; the price being the same. Unfortunately, residual products only brought in £4411, against £5845, owing to the low price at which coke and tar had to be disposed of during the autumn, and to less coal having been carbonized. The balance carried to profit and loss was £7812, against £7735 the previous year. There was, however, a special charge against this in profit and loss, of £136—being the amount of subscriptions to various war funds. The net balance of profit and loss was £12,085; and as the proposed dividend would absorb £6772, there would be left £5312 to carry forward. The works were recently inspected by the Directors; and they were able to confirm the Engineer's report that the plant was in good order. The past half year had been a fortunate one for the Company. It would be dangerous to say what the future had in store. Certainly there were difficulties which caused the Directors and the officers much anxiety. Coal supplies had been obtained by the Company during the half year with less difficulty than many companies had experienced. It was, however, a trouble that would increase; and there was the further certainty that a much higher price would have to be paid for coal under future contracts. The responsibilities of the management had increased owing to the employees who had enlisted. The number of these was not so large as with some companies—being only sixteen. Still it had had an effect. Throughout the half year, from their devoted Engineer and Secretary to the workmen, the Company had been most loyally served. With the continuance of this dreadful war, it was impossible to forecast the future. It would be the aim of the Board to avoid raising the price of gas; but should this be necessary, in order to protect the interests of the proprietors, the Directors would not hesitate to do so.

Dr. J. W. Lee Glaisher, F.R.S., seconded the motion, which was unanimously carried.

Proposed by the Chairman, and seconded by Mr. A. M. Paddon, dividends were declared, less income-tax, at the rate of 5½ per cent. per annum on the 5 per cent. ordinary stock and 5 per cent. per annum on the 5 per cent. preference stock.

The Chairman mentioned that Mr. Samuel Cutler (a member of the Board) was confined at home by a severe attack of bronchitis. Proceeding, he moved the re-election of the retiring Director (Dr. Glaisher).

Mr. A. W. Oke seconded the motion, which was unanimously carried.

Dr. Glaisher, in acknowledging his re-election, said he should like to take the opportunity of congratulating the proprietors upon having Mr. Phillips as the Chairman. For years past, the Company had followed his advice in all technical matters; and he (Dr. Glaisher) was extremely pleased he was willing to serve as Chairman. Mr. Phillips had already done great things for the Company; and he was the right man in the right place.

Proposed by Mr. E. W. Drew, and seconded by Mr. F. R. Smith, Mr. James Randall was reappointed an Auditor.

The Chairman proposed a vote of thanks to the Engineer, staff, and workmen. He remarked that the best thanks were due to them for their excellent service during the half year. There was one satisfactory feature he might allude to, and that was the relation of capital to gas sold was reduced last year by 1s. 1d.; so that they were continually moving in the right direction.

Mr. L. Andrews, in seconding, also complimented the Board and the proprietors upon having secured the services of Mr. Paddon as a Director.

The proposition was cordially passed.

Mr. Chapman acknowledged the vote on behalf of the staff, workmen, and himself. Everybody, he said, had done his best; and there was mutual sympathy and good will between the Company and the workmen. He also paid a tribute to the late Mr. Baynes, whose friendship he had enjoyed for the past forty years. He was certainly a wonderful man; and the kindest he had met in his experience.

Moved by Mr. Andrews, seconded by Mr. Pilley, a hearty vote of thanks was passed to the Chairman and Directors—the seconder also tendering to Mr. Paddon a welcome from the proprietors on his first appearance as a Director at one of their meetings.

The Chairman, in responding, said the Directors very much appreciated this vote of thanks. They had had some anxiety in the past half year, and they fully realized that in the future they would have still more anxiety. He was strongly impressed with the idea that, generally speaking, the people of this country did not realize the serious position they were in. "Are we downhearted?" "No!" It was all very well to use these expressions; and it was very desirable that they should keep up their spirits. At the same time, they must all of them realize to the fullest extent their serious responsibilities. He much regretted to see the great and sad disturbances in the industrial world. Recently he was in France; and, by the kindness of the French commanders, he paid a visit to a considerable area of the battlefields and fighting ground. He could assure those present that the destruction and desolation were appalling. Now he could not help thinking, if the British people fully realized the possibility of such a thing taking place in this country—he would go even farther and say the probability—that the patriotism of the industrial classes would induce them to cease these agitations and their excessive demands. He feared too many of them had as their motto, "Everyone for himself, and God for us all."

GAS, ELECTRICITY, AND WATER SUPPLY AT ALDERSHOT.

The Half-Yearly Meeting of the Aldershot Gas, Water, and District Lighting Company was held on the 26th ult.—Mr. W. T. Robertson in the chair.

The accounts presented showed that the revenue in the six months ended the 31st of December last was £44,135, and the expenditure £34,422; leaving a surplus of £9712. The Directors recommended a dividend for the half year at the rate of £5 18s. per cent. per annum on the "A" stock, of £4 8s. per cent. per annum on the "B" stock, and £5 per cent. per annum on the "C" consolidated stock, all less income-tax. The Directors reported an increase of nearly 11 per cent. in the sales of gas, exclusive of works and special contracts, and a larger revenue from water. The electricity station at the North Camp and Farnborough works commenced operations on the 19th of December.

The Chairman, in moving the adoption of the report, said the Company had made sufficient profit to enable them to pay the statutory dividends and carry forward a substantial balance, which was a rather exceptional condition of things at the present time. It showed how well they had done in the past half year; but it was only one criterion of their prosperity. There had been a gradual increase in the consumption of gas over a series of December half years, notwithstanding the competition of electricity. Coal was costing more, but by the aid of improved appliances they were extracting from it a greater quantity of gas than formerly. Freights were also higher. With regard to water, in the military district of Aldershot, where there were troops aggregating some 150,000, they had had an abnormal demand; and, considering everything, they must congratulate themselves that they had been able to meet it in the fullest possible manner. This spoke volumes, not only for their supply, but for the very great care and attention paid to the mechanical appliances by their General Manager (Mr. R. W. Edwards) and his excellent staff. The increases he had indicated could not be carried out without additional plant; and it was due to the General Manager to say that upon his advice—he was always looking ahead—they had in the last few years put their works into such a condition that they were enabled to fulfil all the obligations which had been thrust upon them in the present crisis. Referring to the electric light installation, the Chairman stated that about fifty large consumers had been connected; and he expressed the hope that at the next half-yearly meeting he might be able to give a better report in regard to this part of the Company's business.

The Vice-Chairman (Dr. F. Stroyan) seconded the motion; and it was carried.

The retiring Director (Mr. T. A. Braddock) having been re-elected, thanks were accorded to the Chairman, Directors, and staff, the acknowledgment of which brought the proceedings to a close.

LONGWOOD AND SLAITHWAITE AMALGAMATION.

First Meeting of the United Company.

The Annual Meeting of the Longwood and Slaithwaite Gas Company was held on the 25th ult.—Mr. R. Thornton (the Chairman) presiding. There was a large attendance.

The Chairman, in moving the adoption of the Longwood report and accounts, which were taken as read, said this was the first time the stockholders of the two undertakings had met as a joint concern; the amalgamation having taken effect as from the 1st of January last. Reviewing the progress of the Longwood Company, he referred to the fact that he was the only one now actively connected with it who was in at its formation in 1859. In 1901 the Colne Vale Company was taken over; and it had proved to be beneficial, not only to the stock-

holders, but also to the district. He also referred to the negotiations which had taken place from time to time between the Huddersfield Corporation and the Company with a view to the transfer of the undertaking. The most recent occurred last year, when the Company were led to believe that the Corporation were in earnest; an expert being engaged on their behalf, and terms for the purchase actually agreed upon. These, however, were not confirmed by the Corporation; and he had no hesitation in saying that they had missed an opportunity of acquiring one of the finest industrial districts in the kingdom. So far as the Company were concerned, they were trying to keep on good terms; but this was not always easy, for the street lighting in Longwood and Lindley had been taken from them without even an opportunity of quoting for it or of showing what gas could do. With regard to the working, the quantity of gas made during the past year was 135,293,000 cubic feet; being an increase of 2,66[illegible],000 cubic feet. Owing to the busy state of trade, the increase in December—the heaviest month of the whole year—was no less than 12½ per cent. The unaccounted-for gas amounted to 6½ per cent., which they would agree was a very reasonable figure. Residuals had not yielded such an excellent return as in previous years; the receipts being about £1000 less. Rates and taxes were growing; the amount being £200 higher than it was in 1913. Renewals were a little higher, the undertaking having been kept in an efficient state of repair. The Chairman went on to refer to the amalgamation of the Longwood with the Slaithwaite undertaking, which he considered a progressive step. It would, he said, involve new works. The two Managers and the Directors had visited several works where up-to-date systems were in operation; and they had finally decided to adopt the system of vertical retorts, by which they expected to have a greater yield of gas and residuals, and an improvement in the labour conditions.

Mr. B. BROADBENT seconded the motion, and expressed the belief that the amalgamation would be a great success.

The motion having been carried,

Mr. WILLIAM CROWTHER, in moving the adoption of the Slaithwaite accounts, said all the details in connection with the amalgamation had been lucidly put before them by the Chairman. The chief consideration which had brought them together was that both the Longwood and Slaithwaite undertakings were growing, and in each case they would have been compelled to do something to extend the producing capacity. It was concluded that one productive works would effect greater economies than two separate ones, and would be jointly to the advantage of the stockholders and the district supplied. The production of gas at Slaithwaite during the past year had been 7 per cent. in excess of 1913. There had been the similar experience to Longwood of a considerable drop in the receipts for residuals.

Mr. SAM HAIGH seconded the motion, and it was carried.

The statutory dividends were then declared; and the retiring Director (Mr. J. R. Hall) was re-elected. Messrs. Sharpe and Sharpe were elected Auditors for the coming year.

The CHAIRMAN proposed a vote of thanks to both the Managers and their staffs. He said that they had given the Boards expert assistance and good advice during the various negotiations and consideration of the new works, and thoroughly deserved a word of appreciation.

Mr. J. H. BREARLEY (the Engineer and Manager of the Longwood Company), in responding, referred to the onerous conditions which had prevailed during recent months in respect to coal supplies and the carrying on of the undertaking generally. Thirteen of the Company's employees had joined the country's forces, but those left behind had given loyal service; and on their behalf he especially appreciated the resolution. The negotiations for amalgamation had been carried through without a discordant note, either between the two Boards or the officials; and they had confidence in the wisdom of the step.

Mr. JOHN FURNISS (the Engineer and Manager of the Slaithwaite Company), in acknowledging the vote, referred to the fact that he had attended no less than thirty-seven annual meetings of his Company. So far as he was concerned, however, he sank all private opinions, and came to the conclusion that the amalgamation was desirable. The works at Slaithwaite rendered extensions imperative; and he was convinced that when the new works were completed the decision of the Directors would be thoroughly justified.

A vote of thanks was then accorded to the Chairman; and this having been acknowledged, an extraordinary general meeting was held at which resolutions authorizing the raising of additional consolidated ordinary stock to the extent of £10,000 and mortgage capital to the amount of £16,666 were unanimously carried.

Gas Consumption at Abingdon.—At the annual meeting of the Abingdon Gas Company, it was stated that during 1914—the first year of electric light opposition—there was an increase of 350,600 cubic feet in the sales of gas. The usual dividends were declared; the distribution for the year (including the interim dividends) being at the rate of 12¼ per cent. on the original and "A" shares, and 9¼ per cent. on the "B" shares. A sum of £220 was applied to the reserve fund, and £1044 was carried forward.

Fatality at the Gillingham Gas-Works.—An inquest was held last Tuesday into the circumstances attending the death of a youth named Downer, who was drowned in a gasholder tank at the Gillingham works of the Rochester, Chatham, and Gillingham Gas Company. Another boy employed by Messrs. Samuel Cutler and Sons on the new holder said the crown was not entirely covered with plates; but the staging was of the usual kind. There was a raft in the water; and within three minutes of his hearing deceased fall, a life-buoy was thrown in. The foreman erector said there were four men near the lad at the time; but they left him and ran after witness, who was in the engine-house. He could not account for the boy falling, as everything was quite in order. One of deceased's boot heels had some leather torn away; but witness said there were no nails driven in the planks. A police-constable pointed out that it was raining at the time; and the plank would be exposed to the weather. The Jury found that the occurrence was accidental; and deep regret was expressed at the fatality by a solicitor on behalf of Messrs. Cutler and Sons, and by the Engineer and General Manager (Mr. C. V. Bennett) on behalf of the Company.

NEW SCALE OF CHARGES AT BIRMINGHAM.

The Birmingham City Council, at their meeting last Tuesday, agreed without discussion to a proposal of the Gas Committee to introduce a new scale of charges, involving a small increase in the price of gas. This new scale [which was given on p. 540 of last week's "JOURNAL"] will come into operation as from the March reading of the meters.

In moving the reception of the Committee's report, Alderman Sir Hallewell Rogers said it was estimated that at the end of the current financial year the prices realized for coke, tar, and liquor would be approximately 1s. per ton of coal carbonized lower than last year; and this would mean a reduction in income of at least £40,000. They had also to face an advance in wages; but the effect had not been so marked, owing to the various savings which the engineers had been able to make. This year the conditions were entirely abnormal. The cost of all raw material had advanced; and other heavy charges, directly or indirectly attributable to the war, had to be met. The cost of allowances to men who had joined the army would amount approximately to £16,000 per annum. They had also, like most manufacturers, found it exceedingly difficult to fill the places of men who had gone to the front; and this applied especially to the retort-house men. The new men had to some extent to be taught their job; and, therefore, the gas-making results were affected. Having regard to the increased cost of production, it had been felt by the Committee for some time that it was impossible to justify some of the lower prices that they had been charging for gas under the existing schedule. The Committee required from £70,000 to £75,000; and the question was, which was the best way of raising the money. They thought the scheme they proposed was the fairest to the consumers all the way round. It meant that every consumer started on the same basis, and paid a lower price for increasing quantities of gas used. The small consumer through the ordinary meter was only raised 1d. per 1000 cubic feet; while the rates for prepayment meters had been left untouched. Even with the increased prices of gas, he would like to point out that Birmingham gas consumers would still be in a more favourable position than those in most other towns. The highest lighting price in Birmingham would be 1s. 10·8d. net, and the lowest price 1s. 3d. Should only a moderate and justifiable increase take place in the price of coal, and if the residual markets went no further against them, it might not be necessary to come to the Council for a further increase of prices this year, though the margin of profit available for the relief of the rates at March, 1916, would not be more than they had estimated for the present financial year. The coal market, however, was in a very unsettled state; and he was much afraid that, unless the conditions altered considerably, it might be necessary to come later in the year to increase the prices now recommended.

COAL SCARCITY AT BELFAST.

The minutes of the Gas Committee which were adopted at the monthly meeting of the Belfast Borough Council contained the following reference by Mr. J. D. Smith (the Engineer) to the existing coal shortage.

For two months past, I have had considerable difficulty in obtaining our schedule quantity of coal from contractors, owing principally to difficulties due to the war. Up to November, supplies were plentiful; and I took the precaution of filling every available space in our works with coal. Early in December, however, the output from the mines became much less, owing to the number of colliers enlisting; and I began to experience difficulties in getting supplies. Matters rapidly grew worse; the collieries asserting that 25 per cent. of their men had gone to the war, and that the railways could not move their waggons as usual, owing to the Government control for the carriage of troops. This led in some cases to pits being closed-down for want of coal-waggons. Again, the Government had so many ships chartered for the transport and carriage of stores that vessels got very scarce, and freights rose rapidly, until at present 8s. or 9s. per ton is being paid from Garston to Belfast, as against 3s. 3d.—the usual rate. The most serious matter, however, has been the closing of the port of Belfast at night by the Military Authorities, which has reduced the carrying capacity of the local boats by 50 per cent.; and as it is almost impossible to charter outside steamers to make up the shortage, a coal famine has ensued. In spite of every endeavour and incessant labour on my part, I had to take 6000 tons out of stock in December, and the same quantity in January; and this leaves the stock just now perilously low. I therefore thought it my duty to pick up any coal available, and bought 2000 tons to help me along. The sinking of some ships in the Irish sea by a German submarine created a panic among shipowners; and for almost a week I did not get a ton of coal delivered. I was therefore reluctantly compelled to shut-down a large part of the coal-gas plant, in order to save the stock, and to stop the sale of coke, except small quantities to the shipyards, bakeries, and foundries. This step was absolutely necessary to keep the works safe; but if proper supplies of coal can be obtained shortly, sales can be resumed in the usual way.

CARFIN GAS ARBITRATION.

The Motherwell Town Council having given notice in July last of their intention to purchase the undertaking of the Carfin, Newarthill, Cleland, and Districts Gas Company, under the Burghs Gas Supply (Scotland) Act, 1876, the Arbitrators appointed have now issued their award.

The price to be paid to the Company by the Town Council of Motherwell will be £23,755, with interest thereon of 5 per cent. per annum from June 17, 1914, until payment. The items in the balance-sheet as at June 17 last of sundry debtors, cash on hand, and credit balance

with the bank, are to remain the assets of the Company. The undertaking is held to have been transferred to Motherwell as at that date. The Town Council are liable for the full expenses of the arbitration. The Arbitrators were: For the Burgh of Motherwell, Mr. G. R. Hislop, of Paisley; and for the Company, Mr. J. W. Napier, of Alloa. The Company was a non-statutory one; and the amount of gas sold by the Company for 1914 was 13½ million cubic feet. The capital of the concern amounted to £13,456. The undertaking has been rapidly progressive, having been in existence for only about five years.

This arbitration possesses a distinct feature of importance in the transfer of gas undertakings under the Burghs Gas Supply (Scotland) Act, 1876; it being the first of its kind. The area of supply of the Carfin Gas Company is situated partly within the Burgh of Motherwell and partly in the County Council area. The Motherwell Town Council adopted the Burghs Gas Supply (Scotland) Act, and purchased the undertaking of the Motherwell Gas Company in 1914; and consequently they desired to have the gas supply within the whole burgh from their own works. The question arose as to whether the Town Council could purchase the part only of the Company's undertaking situated within the burgh, or whether they would be obliged to purchase the whole of the Company's undertaking, including the works situated in the county area. The question was referred to Counsel; and it was decided that the Town Council must purchase the whole of the Company's undertaking as set forth in clause 21 of the Burghs Gas Supply Act; it being stated therein: "The Commissioners . . . shall give notice to such company that they are willing to buy, or to treat for the purchase of, the undertaking of such company, and of all the rights, powers, and privileges, and all the lands, premises, works, and other property of the company." It may be further stated that the Motherwell burgh have no power to supply gas in the county area; the rights being vested with the Lanarkshire County Council, under the Lanarkshire Gas Order, 1914.

METROPOLITAN WATER BOARD BILL.

The Deficiency Rate.

At the meeting of the London County Council on Feb. 16 the recommendation of the Local Government Committee in regard to the Water Board deficiency, already published in the "JOURNAL" [p. 404], formed the subject of a discussion regarding the constitution and working of the Board.

Mr. E. G. EASTON (one of the Council's representatives on the Water Board) said he thought the attention of the Council should be called to the position taken up by them in regard to the Board. The difficulty arose through the inequality of the contribution to the deficiency rate by outside authorities; and the question had been discussed by the Board on many occasions. He did not know what could have instigated the Local Government Committee to suggest the promotion in Parliament of a Bill to alter the existing contributions from the outside authorities; but he desired to call the attention of the Council to the fact that the amount in dispute on a deficiency rate of £63,000 was only £1100. When the Board considered the question, they viewed with some apprehension the fact that the Parliamentary Committee of the Council were very anxious that a Bill should be promoted for the purpose of making an alteration in the contribution to the deficiency rate. The Board made these charges under their 1902 Act (which was passed before that body came into existence), and so they had no authority to vary the charges; and though it might be urged that London as a whole suffered by the existing contributions from the outside authorities, the Board were somewhat divided as to taking any action. They had no objection to the Council promoting any legislation they pleased for a re-arrangement of the charges of the Board, but the Board objected to be saddled with the cost of promoting such a Bill. He invited the Council to consider whether it was wise to carry the Committee's recommendation. Before actually recommending the Board to promote a Bill, the suggestion of a conference should have been adopted. The Board were anxious for a re-arrangement of the charges. They had a limited income and an unlimited expenditure; and they might be compelled to raise the rate 2d. or 3d. in the pound. The 1902 Act did not allow the Board to fix their deficiency rate upon the rateable value of the outside authorities. All they were allowed to fix on was the water-consuming value. In this particular case, he thought the recommendation regarding the promotion of legislation had been injudiciously made; and he appealed to the Chairman of the Committee to withdraw it.

Sir J. W. BENN, Bart., said of course it was true that London suffered grievously under the present arrangement; and the Board had never gone out of their way to remedy the grievance. The assessment outside was not the same as the assessment inside, so the happy people who lived in the outside areas had their water cheaper. If the charge were on the rateable value, and this was arranged on a basis of 25 or 30 per cent. less than the assessment within the area, then the outside people would benefit in the price of the water. The population in the centre was going outside; and he asked if it was not time that this injustice to the Administrative County of London should be remedied. It was a sorry business; and they could only say, "We told you so. You would have this precious Board, and £4,000,000 or £5,000,000 more was paid to the Companies than they would have got by a fair and proper arbitration." They had their Board, and he hoped they liked it.

Mr. LAURENCE W. S. ROSTRON (the Chairman of the Local Government Committee) regretted that he could not respond to Mr. Easton's appeal and withdraw the recommendation. He did not desire to attack the Board or to show any hostility towards this body. They merely recognized, as anybody who had paid any attention to the position must recognize, that the unfortunate deficiency rate seemed to have come to stay. Everyone admitted that the present method of meeting it was unfair and unsatisfactory, both to the County of London and to the outside authorities, and as between the different districts of London, because in London it was a great grievance that those districts which had a number of private wells paid less than their proper share of the deficiency rate of the Board. Although the question of the deficiency was probably a matter entirely for the Board, they did think it was ripe for speedy settlement; and they were endeavouring to deal with it in a conciliatory manner, and not to dictate to the Board more than they possibly could. The Committee had shown a willingness to meet the Board by asking them to accept the resolution on the principle, which he thought they could hardly refuse, and to have a debate on the second reading. A conference could then be held, to see whether they could not agree on some better method of dealing with the deficiency rate.

The Council then adopted the first portion of the recommendation.

On the motion to communicate with representatives of the Council on the Board, and with the City and Borough Councils, in regard to the matter,

The Rev. STEWART D. HEADLAM (another of the Council's representatives on the Board) pointed out that those on the Board representing the Council were quite at one on the matter, and needed no "bucking-up" by the Council. They were unanimous that the difficulty was, first, that a lot of people (mainly in the City of Westminster and the City of London) had, most unfairly in his opinion, their own private wells. These people were therefore paying very little for the water they needed just as much as anybody else to put out their fires and to water their roads. There should be some means of compelling the owners of private wells to contribute towards the deficiency rate; and this would have a good deal of influence in dealing with the question. The Council ought to consider whether they should not go further, and recommend that water should be paid for out of the ordinary rates.

The second portion of the recommendation was then agreed to.

Second Reading Debate on the Bill.

On the report of the Parliamentary Committee with reference to obtaining a second reading debate on the Bill,

Mr. EASTON inquired what expenditure would be incurred by the adoption of the recommendation. Were the Council going to spend some thousands of pounds, and what benefit was likely to accrue?

Mr. F. ST. JOHN MORROW (the Chairman of the Parliamentary Committee) replied that the proposition of his Committee would not involve the employment of Counsel. A debate on the floor of the House would only involve a limited expenditure, and would be confined to a circular to be sent to the various London and other members whom the Parliamentary Committee might think it desirable to circularize.

The recommendation of the Committee was adopted.

HOUSES OF PARLIAMENT AND POSSIBLE HOSTILE ATTACKS.

Interesting Reminiscences of a Century Ago.

The "Co-Partners' Magazine" of the Gas Light and Coke Company for the current month contains an interesting reminiscence of the troublous times of the early part of last century. It is a copy of a letter addressed by the Deputy-Governor of the Company (Mr. David Pollock) to Lord Sidmouth, on March 11, 1815 (shortly before the Battle of Waterloo), on the subject of the safety of the Parliament Buildings in the event of hostile attack—a subject which then, as now, was causing some anxiety to officers of the State, and calling for a certain amount of co-operation and help from the Company. Mr. Pollock had been invited to attend at the Home Office, where he gave to an august company certain verbal assurances which he was requested to confirm in writing. This he did as follows: "I have the honour to report to your Lordship that I have conferred with the Company's Engineer, and have now to repeat for your Lordship's information that no gas pipe whatever is placed under any part of the Houses of Parliament or the buildings adjoining, and that the several tubes of communication from the mains to the lamps in the interior of those buildings are so perfectly secured from every species of woodwork and other materials of a combustible nature as to preclude the possibility of accident, inasmuch as no part of such tubes is within the distance of several inches from any such woodwork, and whenever they approach so near, the woodwork is cased with sheet iron, so as to afford it complete protection in case the nearest part of the tube should be fractured and the gas at the fracture set on fire. I think it right, however, to apprise your Lordship that the pipe of communication from the main which supplies the gas to the lamps in Westminster Hall, and all the lights in the passages to the Houses of Parliament except the great pedestal lamp upon the staircase, is a cast-iron pipe of 2 inches in diameter, which runs up an angle at the Great Entrance to Westminster Hall. This pipe, however, is entirely within the hall; so that any attack upon it must be made by a person in the interior. This is the only exposed part of the Company's pipes within reach; and the effect of destroying the communication through this pipe would be merely to extinguish the lamps supplied from it. After the verbal explanations I have already given to your Lordship, I have only to add that it is the opinion of the Company's Engineer as well as myself that the possibility of rendering any part of the Company's works subservient to the mischievous purposes of evil-disposed persons is so remote, and the measures necessary to render their uses abortive so little understood and so impracticable, that no extraordinary measures of precaution appear to be necessary. On this subject, however, I beg entirely to defer to your Lordship after the statements I have already made."

The Directors of the British Gaslight Company, Limited, will, at the half-yearly general meeting to be held later on this month, recommend (subject to audit) a dividend at the rate of 10 per cent. per annum, with a bonus of 2s. 6d. per share, for the half year ended Dec. 31—both less income-tax, and payable in April.

NOTES FROM SCOTLAND.

From Our Own Correspondents.

Saturday.

In the "Notes" in the "JOURNAL" for the 16th ult. it was mentioned that the shareholders of the Cambuslang Gas Company had agreed to make application to the Treasury for sanction to the raising of £15,000 for the erection of a gasholder. The request was duly sent in, and it was pointed out that the matter was urgent, as, notwithstanding the present consumption of 100 million cubic feet of gas, the Company would be faced with a shortage in supply. The reply is as follows: "I am directed by the Lords Commissioners of His Majesty's Treasury to inform you that they see no objection to the proposed raising of £15,000 loan by the Cambuslang Gas Company. I am further to say that, in their Lordships' opinion, capital expenditure should not be incurred by the Company at the present time if it is possible to avoid or postpone it."

The Edinburgh and Leith Gas Commissioners are following up the lecture delivered by Mr. Lord, on "Gas-Furnaces for Industrial Purposes," noticed in the "JOURNAL" last week, by one on domestic hot-water supply. The Engineer and Manager (Mr. Alexander Masterton) has issued a circular announcing that the Commissioners have presently arranged with Messrs. John Wright and Co. for their hot-water expert, Mr. Frederick Dye, to deliver a lecture and give practical demonstrations on "The Gas-Heated Circulating Boiler and its Application to the Domestic Hot-Water Apparatus," in Leith Walk School, Edinburgh, next Thursday evening. The lecturer will deal with the cost of heating water by gas, and the important duty performed by the automatic gas-valve, or thermostat, the action of which will be demonstrated, as well as methods of connecting-up gas-boilers to existing hot-water apparatus to admit of either the gas-boiler or the range-boiler being used independently or both together, as may be desired. Mr. Dye will show his audience how to ascertain the power of a gas-boiler, and how to recognize and remedy faults in the existing hot-water apparatus which affect it; and the essential features in a gas-boiler will be described and demonstrated. At the conclusion of the lecture, which will be of special interest to plumbers, gas-fitters, and others, a discussion will be invited.

The scheme now in hand to extend the gas-works at Motherwell is estimated to cost £25,000. In addition to this, the Corporation will improve and enlarge the distribution system at an outlay of £5000. The plant in progress, and to be available for work during next winter, is a setting of vertical retorts on the Wilson system, capable of producing 1½ million cubic feet of gas per day, including coal and coke handling plant, coke-storage bunkers and telpher plant, and coal-storage. Plans have just been passed by the authorities, and operations will go on systematically under the supervision of Mr. Alexander Mackay, the Corporation Gas Engineer and Manager. The town has prospered and extended, so that at present most of the manufacturing and distributing plant is overtaxed. It had at first been thought necessary to erect entirely new works on another site; but careful planning has made the present ground available. Railway sidings are also to be run into the works. The large expenditure involved will, however, be attended by so many advantages that, by the introduction of appliances for the abolition of labour, the annual saving will more than justify it on financial grounds. The Motherwell Corporation will shortly annex the area of the Carfin, Newarthill, and Districts Gas Company; the arbitration proceedings being practically completed by the Arbiters making an award of £23,755, as recorded on another page.

The subjects of the extension of the gas-works and the salary to be paid to Mr. Mackay came before the Town Council at their monthly meeting on Tuesday. The Gas Committee reported that plans had been submitted for a new coal-store; and they recommended that they should be approved of and the work proceeded with as quickly as possible. On the question of Mr. Mackay's salary, the Convener of the Committee reported that the Engineer's house, which was on lease till November next, was in the market for sale, and Mr. Mackay wished to know his position—the free tenancy of the house, including taxes, being part of his engagement. Provost Wilson, seconded by Mr. Macneill, moved that the Engineer be allowed a salary of £400 per annum, and that he find a house for himself. An amendment was moved that the salary be £450 per annum. The voting being equal, the Convener gave his casting vote in favour of the amendment. It was agreed that this finding should take effect as from the 15th of May next, and that as from then the Engineer should be responsible for the rent and taxes of his house till the expiration of the lease, whether he occupies the house or takes another. Mr. Frood, in the course of his remarks when moving the adoption of the report, referred to the conditions under which Mr. Mackay had been engaged, and asked the Council to approve of the Committee's recommendation. He said they had found Mr. Mackay a very efficient and competent man, and they had confidence in his ability to carry out the work which had been put upon him through this extension. He was a man of method and energy, and stood very high in the gas profession. He might say that previous to the concern being taken over by the Corporation Mr. Mackay was offered an increase in salary by the Company; but he declined it, as he preferred to wait till the undertaking had been transferred. Mr. Macneill thought the salary should be £400, and he said that if the concern improved, as they expected it would do, they could give him an increase. Mr. Murray suggested a middle course—that they should pay the Engineer £400 a year, purchase a house for about £800, and let him have it rent free. Mr. Frood acknowledged that there was a great deal in what Mr. Murray had said; but, taking into account the enormous amount of work that would shortly devolve upon the Engineer, he expressed the hope that the Council would agree to a salary of £450. On a division, the report was adopted by seven votes to five.

Increase in Price at Maidstone.—Owing to the increase in coal freights, the Directors of the Maidstone Gas Company have been compelled to raise the price of gas 3d. per 1000 cubic feet. This will cause a reduction of 10s. 6d. per cent. per annum in the dividend.

CURRENT SALES OF GAS PRODUCTS.

The London Market for Tar, Tar Products, and Sulphate.

LONDON, *March 8.*

There is no change practically in the market for tar products. The demand for toluol, 60's crude carbolic acid, and solvent naphtha remains unsatisfied. The value of toluol is settled by the War Office; 60's crude carbolic acid is quoted at 3s. 2d. to 3s. 3d. net per gallon, casks free; and 90-160 solvent naphtha at 1s. 6d. to 1s. 7d. net and naked at makers' works. Creosote is worth 4 1/16d. to 4⅛d. net in bulk at makers' works. Pyridine is quoted at 8s. 3d. net in buyers' packages. Benzol for motor purposes sells readily at 1s. 2d. net at makers' works.

Sulphate of ammonia is steady, although it is reported there is some accumulation of stock at Liverpool and Hull in consequence of lack of sufficient shipping facilities and the temporary difficulties at those ports. The exports for January and February last amounted to 61,483 tons, as compared with 59,601 tons shipped in the same months of 1914, which is quite a record figure for that period. The London makers of 25 per cent. quality have not altered their price; but there is little sulphate available for sale for prompt delivery.

Tar Products in the Provinces.

March 8.

The markets for tar products have remained about the same during the past week. Benzol has kept fairly steady, and there is a fair demand for both prompt and forward delivery. Solvent and heavy naphthas are in good demand. Creosote is quiet, and lower prices have been accepted. Crude carbolic has improved slightly, and better prices have been paid during the past week.

The average values during the week were: Value of liquid products in one ton of tar, 17s. to 18s. Benzol, 90 per cent., naked, North, 9½d. to 10½d.; 50-90 per cent., naked, North, 1s. 3d. to 1s. 4d. Toluol, naked, North, 2s. 2d. to 2s. 4d. Crude naphtha, in bulk, North, 5½d. to 5⅝d. Solvent naphtha, naked, North, 1s. 4d. to 1s. 5d. Heavy naphtha, naked, North, 11d. to 1s. Creosote, in bulk, North, 3½d. to 3¾d. Heavy oils, in bulk, 4d. to 4½d. Carbolic acid, casks included, 60 per cent., East and West coasts, 3s. 1d. to 3s. 2d. Naphthalene, £7 to £11; salts, 65s., bags included. Anthracene, "A" quality, 2d. per unit; "B," nominally ¾d.

Nitrate of Soda.

This article is unchanged in either the tone of the market or in the value of the article at 11s. per cwt. for ordinary, and 11s. 6d. for refined quality, on spot.

Sulphate of Ammonia.

Throughout the week the market for this material has remained in a depressed condition, except for Leith delivery, at which port there have been numerous requirements for early shipment. Consequently, while prices have continued to show a drooping tendency at Hull and Liverpool they have advanced at Leith. The nearest values at the close are £13 11s. 3d. per ton f.o.b. Hull, £13 12s. 6d. per ton f.o.b. Liverpool, and £14 2s. 6d. per ton f.o.b. Leith. No new first-hand business has transpired in the forward position. Producers have still held for £13 5s. at the ports for July-December delivery, but it is reported that middlemen have taken some orders at £13 per ton over this period.

Sulphate of Ammonia in the Provinces.

LIVERPOOL, *March 6.*

From another source it is reported that there has not been much business doing in this article during the past week, but prices have remained about the same. Outside London, makes are quoted at about £13 2s. 6d.; Hull, £13 15s.; Liverpool, £13 16s. 3d. to £13 17s. 6d.; Leith, £13 16s. 3d. to £13 17s. 6d.; Middlesbrough, £13 16s. 3d.

COAL TRADE REPORT.

Northern Coal Trade.

The northern coal market shows continued activity, with steady prices, and more inquiry as to contracts. In the steam coal trade, best Northumbrians are about 20s. per ton f.o.b. for prompt delivery, and from 21s. to 22s. 6d. forward. Second-class steams are about 18s. to 19s. per ton. Steam smalls are in better demand, and vary from 10s. 6d. to 12s. 3d. per ton f.o.b., according to quality. Production is fair, when the number of the miners who have enlisted is borne in mind. Steam tonnage is still scarce at the shipping ports. There have been some sales of best steams to the Admiralty on the basis of 20s. to 21s. per ton f.o.b. In the gas coal trade, prices are rather higher. Best Durham gas coals are from 13s. 9d. to 14s. 3d. per ton f.o.b., with a fair demand for prompt delivery; second-class gas coals are 12s. to 12s. 9d. per ton f.o.b.; and "Special Wears" are from 13s. to 13s. 6d. per ton f.o.b. As to the large contracts for the London Gas Companies there are rumours of some sales at an advance having been made; but figures are rather doubtful as yet. It must also be borne in mind that the question of the freight for sea transit is now one of the most important factors in these contracts, and that the rates of freight are extremely doubtful forward. So that if even the price f.o.b. be known, the cost of the coal in the Thames will be still very uncertain. Coasting freight, however, should be less bulky in the summer. Coke is stiffer, though exports are relatively limited. Gas coke is steady at 11s. 9d. to 12s. 9d. per ton f.o.b. in the Tyne.

Increase in Price at Rochester.—The Directors of the Rochester, Chatham, and Gillingham Gas Company announce that, owing to the great increase in the prices of coal and other raw materials, they are reluctantly compelled to raise the price of gas 3d. per 1000 cubic feet from the date of the next reading of the meters.

Smethwick Gas Undertaking and the War.

How the war is affecting the Smethwick gas undertaking was clearly shown in an official statement issued some days ago. So far the consequences have been rather serious. There has been a shrinkage in the sale of coke to the extent of £1500; the sales of tar have dropped by £700; the interest and sinking fund charges have been £700 more; while there has been an increase in the cost of coal of £2000. The wages that are being paid for men who have gone to the war amounted to £500 or £600. Altogether it is estimated that there has already been a loss to the undertaking as a result of the war of £6481. During the last ten years, the prepayment consumers have had reductions amounting to £4370 per annum; and the concessions to ordinary consumers, excluding power users, work out at £5500 per annum.

Reduced Price of Gas at Chelmsford.

At the recent annual meeting of the Chelmsford Gas Company, the Directors reported an increase, compared with the year 1913, of 10·2 per cent. in the sale of gas, and of £542 in the revenue, notwithstanding the low price of coke and other residuals. The profit and loss account showed an amount of £6697 available for distribution; and the Directors recommended that maximum dividends should be paid. Reference was made to the fact that the Chelmsford Gas Act, 1914, received the Royal Assent on July 31, and that the Chelmsford Corporation were promoting a Bill to obtain power to purchase the undertaking of the Company. The Directors, having regard to its continued progress, had decided to reduce the price of gas 2d. per 1000 cubic feet as from the 1st of January. In moving the adoption of the report, the Chairman (Mr. R. M. Straight) stated that since the Directors last reduced the price of gas, in 1910, coal had risen from 20s. to 24s. per ton; and he thought it was to the credit of the Company that, in spite of this, they had been able to make another reduction. The increase in the consumption of gas had no doubt been caused by the presence of the troops in the district. Referring to the difficulty in getting coal, the Chairman said that, thanks to the Manager of the Great Eastern Railway Company, the Gas Company had been able to supply as much gas as their consumers expected, to the satisfaction of shareholders and customers as well. The report was adopted.

Cheltenham Gas Company.

The annual meeting of the Company was held on Monday of last week, when Mr. R. Ticehurst (the Chairman), in moving the adoption of the report and accounts, said the gross revenue for 1914 was £74,537, and the expenditure £61,516, leaving a gross profit of £13,021. There had been an increase in the amount received from private consumers; and cooking-stoves and gas-fires were a great and growing source of revenue. At the end of the year, 8284 cooking-stoves were in use—an increase of 299 on the previous year; while the gas-fires sold constituted a record. The total number of customers was now 13,354, being 184 more than in the preceding year. Residuals showed a distinct falling-off. The Directors attributed this solely to the war, as the sales up to August were entirely satisfactory. The falling-off was chiefly noticeable in tar and ammoniacal liquor, the sales of which were immediately affected on the outbreak of hostilities. There were, however, signs of a revival in the demand for both these products. Coke also exhibited a decline; but this was attributed to the mildness of the autumn. Lately the demand had been greater. Working expenses had considerably increased. The cost of coal was £1300 in excess of the previous year, and wages had risen nearly £500. Sixty men had gone to the front, and provision had been made for their dependants. Consequent on the extra expenditure, the Directors had raised the price of gas 2d. per 1000 cubic feet; and they had reason to fear this might not be sufficient. If more had to be paid for coal, they might be driven to still further raise the price of gas. To meet capital expenditure, £5000 of consolidated stock would shortly be issued. The report and accounts were adopted, and a dividend at the rate of 5 per cent. (less income-tax) was declared.

Elland Gas Company.—At the annual meeting of this Company, the report presented by the Directors showed a profit, including the balance brought forward, of £11,369. In moving its adoption, the Chairman (Rev. G. E. Aspinall) said that owing to the war their accounts were not so favourable as they might otherwise have been. On the whole, however, they could congratulate themselves that the disturbance to their business had been very small. The great drop in the income arose from residuals; and the decrease in the sales on this account was no less than £1163. Although they found the balance on the profit and loss account was less by £1360, he thought they had every reason to be well satisfied that things were no worse. The balance available for distribution was £7988; and the Directors proposed to pay full dividends on the 4 per cent. preference stock and on the new ordinary 5 per cent. maximum stock, and 7½ per cent. for the year on the converted ordinary stock. The report was adopted.

Cork Gas Consumers' Company.—The accounts adopted at the meeting of the Company showed a small increase in rental. There was an increase in the consumption of gas for motive power, manufacturing purposes, cooking and heating, and also in connection with the slot-meter system. The balance of profit was £7279, out of which it was recommended that a dividend should be paid at the rate of 8 per cent. per annum, amounting to £5300, and leaving £1979 to be added to reserve. It was pointed out that during the past twelve months 182 cooking-stoves, 111 heating-stoves, and 150 smaller appliances had been fixed—making a total of 3212 cookers sold or on hire, 2877 heating-stoves, and 4349 smaller appliances. These were quite apart from what they supplied to slot consumers. As to coal, it was in the current half year that they would feel the very serious effect of the rise in freights. They had had to pay as much as 18s. a ton freight; and it might be necessary to increase the price of gas in order to meet their liabilities.

Eastbourne Gas Company.

Dr. G. A. Jeffery, J.P. (the celebration of whose Golden Wedding was referred to in the "JOURNAL" a fortnight ago), presided at the half-yearly meeting of the Eastbourne Gas Company, and went at length into the matters dealt with in the report [*ante*, p. 400]. He explained that the Company had been put to very great expense and inconvenience through the closing by the Government of the port of Newhaven, where their sea-borne coal used to be received. As a consequence, it had been necessary to raise the price of gas 2d. per 1000 cubic feet. This, it was hoped, would be taken off as soon as the war ceased; and, he added, "it would never have been put on but for the action of the Government in so seriously interrupting our coal supplies." The position had been one of great anxiety and difficulty; but they had had the hearty co-operation of the Secretary (Mr. J. S. Garrard) and his staff, and of the Manager (Mr. W. H. Hammond) and his staff at the works. They were pleased to welcome their new Consulting Engineer (Mr. Frank H. Jones), who would doubtless follow worthily in the footsteps of his father, who had advised the Company so ably in the past. Mr. A. W. Oke voiced the congratulations of the proprietors to Dr. and Mrs. Jeffery, and added that there were two items which he was pleased to see in the accounts bearing on the war. One was the subscription of 100 guineas to the war relief funds, and the other was the allowance made to the dependants of those employees who were on active service. It was mentioned by Mr. Garrard that over fifty of the Company's men have joined the Colours.

Chester United Gas Company.

The revenue of this Company for the six months ended Dec. 31 was £22,720, and the expenditure £18,345; leaving a balance of £4375. After providing for the payment of the interest on the debenture stock and the dividend on the preference stock, there was a balance of £4089 to the credit of the profit and loss account, out of which the Directors recommended, at the recent general meeting, the payment of a dividend on the ordinary stock at the maximum rate of 2½ per cent. for the half year. This, according to a statement submitted by the Secretary and General Manager (Mr. F. A. Pye), would absorb £3928, and leave £161 to be carried forward. Under the supervision of the Engineer and Works Manager (Mr. John C. Belton), 13,734 tons of coal were carbonized or used during the half year. The quantity of gas sold by meter within the city was 104,215,530 cubic feet; beyond the city, 32,132,100 cubic feet; for public lighting, 2,000,810 cubic feet. In moving the adoption of the report and accounts, the Chairman (Alderman J. M. Frost, who is the Mayor of the city) pointed out that there would be observed in the revenue account a satisfactory increase in the sale of gas. While there was a marked reduction in the quantity supplied to licensed premises and restaurants, owing to restriction of the hours of opening in the one case and lack of visiting and entertaining in the other, there was, on the other hand, a gratifying and continuously growing demand for all sorts of gas appliances, resulting in a largely increased sale for heating and cooking stoves, engines, and furnaces, in addition to which the various military depôts in the Company's area had required large quantities of gas. The return from residuals showed a very serious decline; the prices received for coke, tar, and sulphate of ammonia having been very low during the whole of the half year. An improvement took place in December; and at present the outlook was good. He was proud to say that, out of an office and fitting staff of 45, the Company had 12 men with the Forces, in addition to 20 men from the works. In each case, where the men had dependants, an allowance had been made, sufficient to make up their domestic payment to an amount about equal to the average while in the Company's employment. Having referred to the high price of coal, the Chairman announced that the charge for gas would be raised to 2s. 11d. per 1000 cubic feet as from the 18th inst., and that the Directors were considering the advisability of increasing the storage capacity of the works. The motion was carried, and the dividend recommended declared. Thanks were accorded to the Chairman and Directors, the Secretary, the Engineer, and the staff generally; and the Chairman, in acknowledging the compliment, assured the proprietors that the staff had shown a noble spirit in looking after their interests while so many of their friends were absent.

Harrogate Gas Company.—A record sale of gas last year was the salient feature in the report submitted by the Directors of the Harrogate Gas Company at the half-yearly meeting on the 26th ult. The quantity sold was 303,929,000 cubic feet, or 4,148,000 cubic feet more than in 1913. There was, however, a reduction in the receipts from the sale of gas, owing to the last concession of 2d. per 1000 cubic feet operating over the entire year. The total revenue was £51,857, and the expenditure £40,096; leaving £11,761 to be carried to the net revenue account. The balance of net profit was £27,807; and the Directors recommended the payment of full statutory dividends, less 1 per cent. to be carried to the reserve fund. The make of gas was 329,884,000 cubic feet, and 308,538,800 cubic feet were accounted for. With the exception of the revenue from tar and ammoniacal liquor being adversely affected by the war, there was no set-back in the prosperity of the Company's business.

Woking District Gas Company.—The report presented at yesterday's meeting of the Company (covering the half year ended Dec. 31) stated that the sales of gas showed an increase of 7·03 per cent. over the corresponding period of 1913; but residual products exhibited a decrease of £333. The revenue for the six months was £10,458, and the expenses on revenue account £8199, leaving a net profit of £2259 to be carried to profit and loss account, to which had to be added the balance of £1834 brought forward from the last account. After charging the interest on debentures and loans, and £62 10s. for contribution to the National Relief Fund and grants to wives of employees serving with the forces, there remained an available balance of £3801. The Directors recommended the payment of dividends on the preference stock at the rate of 5 per cent. per annum, and on the "A" and "B" ordinary stocks at the rate of 5½ per cent. per annum, which would absorb £1739, leaving a sum of £2062 to be carried forward.

War Bonus at Birkenhead.

The Birkenhead Town Council have adopted a recommendation of the Wages Committee that a war emergency bonus of 2s. per week should be paid to each workman in the Corporation employ, except to those paid the standard trade union rate, to juniors and apprentices, to artisans receiving 40s. or more a week, and to those to whom advances have recently been made. Alderman J. H. M'Gaul (the Chairman of the Committee) said applications for increases had been received from every employee of the Corporation. The recommendation of the Committee would involve an expenditure of about £7500 per annum. The National Society of Corporation Employees wrote stating that the members viewed with concern the recommendation, and urged the necessity of making the increase 3s. per week all round, The Society also considered that men earning over £2 a week should be considered. A further communication, signed by 147 employees at the gas-works, stated that they did not regard the bonus as a reply to their claim for increased wages. The men tendered a week's notice, to terminate on March 11, unless a more satisfactory settlement was made. Mr. Dodds advised the Labour Party to accept what was offered, without further demur; and Mr. Willmer also warned them not to push their demands too far.

A Record Increase at Colchester.—The quantity of gas made by the Colchester Gas Company during the last half year showed an increase of 7·2 per cent. on the same half of 1913—a record increase in the history of the Company. This, said Mr. W. G. Benham, who presided at the meeting, was no doubt due in some measure to the presence of so large a military force in the borough; but mainly it was brought about by the exhibition so well arranged by their Engineer and Manager (Mr. W. W. Townsend), and others. The report showed that there was a credit balance on the revenue account of £2359; and dividends were declared at the rates of 10 and 7 per cent. per annum.

Mr. Settle's Removal from Exeter.—The "Devon and Exeter Gazette" says: "The many friends of Mr. Thomas Settle, of St. Thomas, Exeter, will learn with regret that, after nineteen years' association with Exeter, he is leaving the city to take up his residence in Leeds. While feeling sorry at his departure, those who have been associated with him in business or in other ways will wish him every success in his new home. It will be remembered that Mr. Settle was for nearly nine years the Chief Assistant and Resident Manager at the Exeter Gas-Works under Mr. W. A. Padfield. Mr. Settle invented the continuous-intermittent system of carbonizing coal in vertical retorts—a system then, and still, yielding 35 per cent. more gas of the same illuminating power from each ton of coal carbonized. Exeter may justly be proud of the fact that the Basin Gas-Works at Exeter was the birthplace of this very valuable plan for the carbonization of coal. The adoption of vertical retorts is increasing rapidly. A plant at the Truro Gas-Works is nearing completion."

Tunbridge Wells Gas Company.

Addressing the shareholders at the annual meeting of the Company, the Chairman (Alderman W. H. Delves) said the Directors, the Engineer (Mr. A. Dougall), and the staff had been faced with great difficulties, with coal being held up in the North Sea and on the railway. The contractors had enforced the war clause; and there had been a serious increase in freight rates. He did not think that they had ever bought from so many different firms before; but they now had a fair stock. He had no doubt they would be able to keep up a good supply of gas without any increase in price. The usual dividends could be paid with a very small diminution of the balance carried forward as compared with previous years. Many new meters and stoves had been purchased; and this action was encouragingly reflected by the increased rental for meters and stoves. There had been an increase of 1000 stoves rented during the past year. Referring to the 34 men who were serving their country, the Chairman said that one had been killed in action and one was a prisoner of war. The Company had made up their allowances to the amount of the wages received before enlistment. There had been 13 million cubic feet more gas consumed; and there was an increase in the gas-rental of £1528, with a very small increase in the expenditure. Some £2000 less had been received from residuals; but this was a feature of all companies in the South of England. Subscriptions to various war funds practically accounted for the increased establishment charges. So far as the present year was concerned, it was not safe to prophesy; but he hoped the war would soon be over, and expressed confidence in the future prosperity of the Company. The report stated that there was a balance on profit and loss account (including the amount brought forward) of £20,886; and after the payment of the dividends recommended, there would be a sum of £14,959 to take to the next accounts.

Increased Price at Teignmouth.—It has been decided by the Teignmouth District Council to increase the price of gas to ordinary consumers by 2d. per 1000 cubic feet, which will increase the revenue by £300. A report presented by Mr. J. A. Gray (the Gas Manager) stated that since 1901 there had been a series of reductions which had brought the price down from 4s. 7d. to 3s. 1d. per 1000 cubic feet. Coal, however, had an upward tendency. The average price of seaborne coal had been 23s. per ton; but it had gone up to 25s. 10d., and the Council were at present paying 28s. and 29s. for coal carried by rail, on which, he thought, they would have largely to depend for supplies in the immediate future. Last year the balance was reduced by £340, the equivalent of 2½d. per 1000 cubic feet on the sales to private consumers, and the present indications were that the balance would be further reduced. In regard to future capital expenditure, the requirements of the undertaking included additional storage for gas and coal, and larger mains in part of the town. The Council were not unanimous in the decision to increase the price; some of the members being of opinion that action should be deferred for the present.

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Neath Gas-Works Management.

A letter was read at a meeting of the Neath Town Council last week from the local Trades and Labour Council, enclosing a resolution passed at a public meeting disapproving of the action of calling upon Mr. R. A. Browning (the Gas Engineer and Manager), who had been in their service for 34 years, to resign, without first of all acquainting him of their reasons for so doing, and also requesting them to arrange for a plebiscite of the ratepayers, to give expression to their approval or otherwise. Mr. Challacombe said he was of opinion that a great injustice had been meted out to the Manager; and he moved that a plebiscite be taken. Mr. J. R. Jones seconded, and said the Manager had been forced or cajoled to resign. The Mayor (Mr. M. Arnold) retorted that he had not resigned, but had accepted the position of Consulting Engineer to the Council. Mr. Challacombe said that Mr. Browning resigned his position as Manager on the ground that he would be given a substantial pension. He had not heard a single reason for calling on him to resign. Only the mover and seconder voted for the resolution. Mr. Browning rose and explained that, what the Trades Council had done had been "on their own," and not at his request. There is talk of a public meeting being held.

Leeds Gas Undertaking.—In the Leeds City Council last Wednesday, Mr. W. Wood referred to the Gas Committee's estimate of expenditure of £106,186 on capital account for the next financial year, and said, while agreeing that certain improvements at the gas-works were necessary, he thought it was not wise at this juncture to spend so much money. During the past ten years, no less than £300,000 had been spent on the gas-works. Since 1870, the Corporation had spent nearly £2,000,000 in equipping the works; and during the last fifteen years nearly £750,000, largely on plant now obsolete. It was, however, pointed out that the reorganization of the gas-works had already been decided upon by the Council.

Gas to Displace Electricity at Shirebrook.—Shirebrook is to discard electricity for domestic illuminating purposes in favour of gas. This announcement was made by Mr. J. N. Derbyshire, the Chairman of the Shirebrook and District Gas Company, at the meeting of shareholders. He explained that for many years the Company had been kept outside the colliery town, which had been lighted both in the houses and streets by electricity supplied from the colliery itself. The Colliery Company had now agreed to discontinue lighting the houses, and to allow the Gas Company to supply the whole of them with gas; but they will continue to light the streets with electricity. The report showed a profit of £2709, which, with a balance of £448 brought forward, made the total amount available for disposal £3157. The Directors recommended that this should be appropriated, as to £2768, by a dividend (less tax) of 10 per cent. per annum, of which 5 per cent. has already been paid, and that £389 be carried forward. The sale of gas last year increased by over a million cubic feet.

Sevenoaks Gas Company.

The Chairman (Mr. W. H. Cronk), in moving the adoption of the report and accounts at the annual meeting of the Company, said he was sure the shareholders would regard them as most satisfactory, especially considering the extra price they had had to pay for coal during the latter part of the year. The profit showed a small increase. Favourable coal contracts had been made; but at the outbreak of war these were cancelled, and owing to the war risks they were paying 7s. per ton over the contract prices. Even then it was difficult to get supplies, owing to the congested state of the railways. The demand for coke and other residuals had been much below that of the previous year. The make of gas was 118 million cubic feet, an increase of 13 millions (being 11 per cent. for the year), which was a record in the history of the Company. The output for the present year was also breaking the record; the increase up to the present time being 4¾ millions (20 per cent.) The make of gas per ton of coal carbonized had increased by 812 cubic feet. The demand for gas appliances had been very heavy. During the year 435 had been fixed; and 81 new consumers were connected. Owing to the increased cost of living, the wages of the workmen had been raised. Since the outbreak of war, 25 per cent. of the employees and staff had joined the forces; and the Company were making suitable allowances to the wives. The Directors had considered the question of increasing the price of gas; and he was pleased to say it would not be necessary to do so at present. A vote of thanks was passed to the Engineer (Mr. J. H. Donaldson), the Secretary (Mr. H. How), and staff for their services during the past year, and for the excellent results obtained. Statutory dividends at the rates of 10 and 7 per cent. per annum were declared.

Newport (Isle of Wight) Gas Company.—The forty-fourth annual report of the Company states that the accounts for the past year showed a balance on the profit and loss account (net revenue) of £11,582, out of which the Directors recommended the payment of a balance dividend of 2 per cent. on the preference stock and of 3½ per cent. on the ordinary stock (less tax), making, with the interim dividend already paid, 4 per cent. and 6 per cent. per annum respectively. The gas sales show an increase of nearly 6 per cent. on the previous year. The course adopted by the Board, of laying in a large reserve of coal in 1913, has proved to be a wise one; difficulty having recently been experienced in obtaining deliveries under the contract, owing to the serious interference to the sailings of vessels by reason of the war. One of the Directors, and one-third of the Company's employees, are on war service. Half-wages have been paid the dependants of the latter. The action brought against the Company by the Corporation of Newport in respect of wharfage dues was satisfactorily compromised at the beginning of the year. A donation of fifty guineas was voted to the fund inaugurated by the Mayor of Newport in connection with the Prince of Wales's National Relief Fund.

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Apology for a West of England Libel.

It will be noticed on reference to the advertisement columns of this issue that a libel action brought by the Horstmann Gear Company, Limited, of Bath, manufacturers of automatic lamp controllers, against the British, Foreign, and Colonial Automatic Light Controlling Company, Limited, of Bournemouth, and John Gunning, the Managing-Director and Secretary of the Company, has been settled before trial, by the defendants consenting to pay a substantial sum to the plaintiffs by way of damages, as well as the plaintiffs' costs as between solicitor and client, and to publish an apology. This sets forth the substance of the complaint, which was that circulars, &c., had been issued stating that the Horstmanns were Germans, having sympathies with the King's enemies. In reality, it appears that all the Horstmanns were born in this country; their mother being a native of Bath. Not one of them can speak the German language; and the direction of their sympathies is shown by the fact that several members of the family are serving in the British Army and Navy, while the elder members have taken a lively interest in the welfare and entertainment of the soldiers who have been billeted in Bath during the last six months.

Normanton Gas Company.—The report submitted at the half-yearly meeting of the Company stated that the profit for the past half year amounted to £1955; and the sum available for dividend was £5550. Dividends were recommended at the rates of 6 per cent. on the original stock and 4½ per cent. on the new stock. The Chairman (Mr. John Armitage) remarked that the time for the completion of the vertical retort installation was January; but the Contractors had been greatly hampered by the withdrawal of men for the army. The report was adopted; and a resolution was passed approving the action of the Directors in granting £53 to the relief fund, and voting a further £50 to be disbursed at their discretion.

East Grinstead Gas and Water Company.—The report submitted at the annual meeting stated that the total receipts were £831 more than those of the previous year. Out of an available balance of £9134, dividends were declared of 9½ per cent. on the "A" stock and shares and £6 13s. per cent. on the "B" and "C" shares, which would leave a balance of £6413 to carry forward. The Chairman (Mr. P. E. Wallis) said that though the war had affected them, they were practically in the same position as they were twelve months ago. The increased consumption of gas for the year was over 2 million cubic feet. This was very satisfactory; but one of the most gratifying features of the balance-sheet was an increase of £70 in the returns from residuals. They proposed to pay the same dividend without raising the price of gas. The Secretary (Mr. E. A. Head) always did his best. The same remark applied to Mr. D. T. Livesey (the Engineer and Manager), the result of whose excellent work during the past year appeared in the balance-sheet laid before them that day. The office staff and workmen had also done very well.

Gas-Stoves and Alterations at Leeds.

There was some opposition at an inquiry held by Mr. A. W. Brightmore, on behalf of the Local Government Board, at Leeds last Friday. The application was by the Corporation, for permission to borrow £15,000 for gas-stoves and £40,000 for alterations at the gas-works; and it was suggested on behalf of the Non-Political Ratepayers' Association that it might be as well to defer the application for twelve months. The Town Clerk (Sir R. E. Fox), however, pointed out that more people required stoves for cooking. The consumption of gas per customer in Leeds was far below what was the case in many towns; and this was to a great extent due to the larger number of cookers, &c., used in these other places. During the forty-three years in which the undertaking had been in the hands of the Corporation the surplus profits had amounted to £356,603, of which there had been a net contribution to the relief of rates of £274,312. Mr. W. B. Leach (the Gas Manager) described the new scheme in detail. He said that, whereas in 1871 the capital charges per 1,000 cubic feet of gas sold was 22s. 6d., the figure was now 8s. 11d. The loss of business due to the recent strike of workers was being rapidly overtaken, despite the reduced public lighting resultant on the war; the chief agencies in this recovery being the popularity of gas cookers and fires. It had been at first proposed to borrow £20,000 for new appliances to be let out on hire; but owing to the war and the attitude of the Treasury, it was decided the requirements of the next twelve months could be met by a loan of £15,000. In regard to the new plant for the works at Meadow Lane and New Wortley, this involved the erection of vertical retorts, in place of the obsolete horizontal kind, new condensers and purifiers, coke plant, telphers, pan ash and breeze plant, and carburetted water-gas apparatus. The scheme was estimated to cost £140,000; but for immediate needs only £40,000 was asked. Mr. G. Wooller, representing 200 master plumbers in the city, then objected to the Corporation dealing in stoves. Mr. Aspinall asked that, if the loan were granted, it should be repayable in the shortest possible time, as the Corporation had been in the habit of "grabbing the whole of the profits." Mr. W. R. Herring (Consulting Engineer) remarked that, so far as the plumbing trade were concerned, they would find it to their advantage to come to terms with the Corporation, because the plumbers would get much more work in fitting than if private traders had the business to themselves. Mr. Leach added that an arrangement was being considered for working in co-operation with the plumbers.

Further Storage at High Wycombe.—A piece of land adjoining the works has been purchased by the High Wycombe Gas Company; and on this it is intended to erect an additional holder, the existing storage being found altogether inadequate. The profit on the past half-year's working amounted to £1237; and with the sum brought forward there was a total of £3836. After paying dividends at the rates of 10 and 7 per cent. per annum, there will be a carry-forward of £2597.

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Watford Gas Company.—That they could congratulate themselves on being in a very healthy and wholesome condition was the comforting announcement made by the Chairman (Mr. E. J. Slinn) at the half-yearly meeting of the Watford Gas Company. He pointed out that the working of the past six months had been exceedingly good; and they were able to pay the same dividend as last year. The report stated that there had been an increase in the sales of gas, but a decrease in the returns from residuals. Of the employees, 24 were serving with the Colours; and the Directors had made suitable provision for their relatives. The profit and loss account showed a balance available of £8349; and dividends were recommended on the "A" capital stock at the rate of 7¾ per cent. per annum, and on the "B" capital stock at the rate of 5¼ per cent. per annum—both less income-tax.

Reduced Unaccounted-for Figure at Harwich.—When informing the shareholders of the Harwich Gas Company that the outstanding feature of the past year's accounts was the great decrease in the unaccounted-for gas—down to 2·67 per cent.—the Chairman (Mr. H. J. W. Jervis) said he suggested as the principal cause the construction of a new gasholder, tight in all its joints, and excellent in workmanship, by Messrs. S. Cutler and Son. The work of reconstructing the quay had hampered operations; and he was glad the Engineer (Mr. W. E. Jolliffe), and all engaged upon the works, had obtained such excellent results as they had. It had been intended to proceed with the construction of a new retort-house; but owing to the uncertainty of the situation this had not been done, and considerable strain had been thrown on the existing plant. Dividends making with the interim distributions 10 and 7 per cent. for the year were declared.

Gas Suicide Cases.—At an inquest held at Hanley, on the bodies of Edward Ramsden (46) and Ruth Taylor (8), who were found asphyxiated in a bedroom, evidence was given that Ramsden was employed by the girl's mother, and the child frequently slept in the same room. When the bodies were discovered, the room was full of gas; and Ramsden was holding in his hand a pipe connected with a gas-stove. A verdict of "Suicide during temporary insanity" was returned at an inquest on Henry Randell, a newsagent, of Gillingham, who suffocated himself by putting his head in a gas-oven. In a farewell message to his wife, he said: "Sorry to leave you so suddenly; no more papers; no more books; no more worries; no more fines for light." The last had reference to a prosecution for not screening his shop lights. A similar verdict was returned in the case of a Brighton widow of independent means, named Bonham, who was found in her bedroom, with an open gas-pipe. Another suicide took place in London; a youth having been found dead through coal-gas poisoning. It was stated that he was depressed because people called him a coward for not joining the army, whereas he was, in fact, physically debarred from doing so. Mrs. Pryme (61), of Ashton-on-Mersey, was found suffocated by means of a tube attached to the kitchen gas-pipe. The discovery was made by her husband, an inspector employed by the Stretford Gas Company, on his return from work.

Leatherhead Water Company.—The receipts of the Company for the December half year were £5530, and the working expenses £2948. The profit and the amount brought forward made a total of £3705. The Directors recommended dividends at the rate of 10 per cent. per annum on the original shares and 7 per cent. per annum on the remainder of the shares. They also recommended the payment of a dividend at the rate of 5 per cent. per annum, being the balance of the deficiency of the maximum dividend for the half year to Dec. 31, 1886, on the share capital paid up at that date. There will be a balance to carry forward of £741.

St. Mary Church Gas-Works.—In the annual report of Mr. F. Chalmers, the Manager of the St. Mary Church Gas-Works, which was presented to the Torquay Town Council last Tuesday, it was stated that the output in 1914 was 48,701,000 cubic feet, as compared with 46,649,000 feet in 1913. There was a decrease in the quantity of unaccounted-for gas from 8·7 to 6·2 per cent. Notwithstanding the competition of electricity, the sale of gas had increased in a very satisfactory manner, and in December was the largest recorded in the history of the undertaking. The maximum day's demand (220,000 cubic feet) was 10,000 cubic feet less than the storage at the works. The gross profit was £400 more than in 1913, and constituted a record in the history of the works. The outlook for 1915 was far from satisfactory. Coal prices had risen to 27s. 6d. per ton in one case, labour charges were likely to be much increased, and all materials were dearer; while the prices received for residuals were lower.

Felixstowe Gas Company.—The war, which broke out in the height of the holiday season, threatened at first to prejudicially affect the business of the Felixstowe Gas Company; but the Directors were glad to be able to state, at the meeting of shareholders on the 27th ult., that the loss of revenue entailed by the absence of visitors had been quite made up by the presence of large numbers of troops in the district, so that there were very few empty houses. The revenue was £11,108, and the expenditure £8758; leaving a balance of £2530. This admitted of the payment of dividends for the year of £9 and £6 6s. per cent., as for 1913, and leaves £1144 to be carried forward, compared with £968 brought in. The Directors record their great appreciation of the services rendered by the Manager (Mr. Frank M. Paternoster) and his office and outdoor staffs during a period of considerable stress and strain; and in the course of his remarks, when moving the adoption of the report, the Chairman (Mr. E. H. Woodmancy), stated that all the men at the works had received at least one advance, and the wages of the general labourers had been twice increased. There was, however, one section of the employees who had not yet benefited; he referred to the salaried men. But the Directors were about to grant them a bonus for the arduous work they had performed during the time the military had been in the district. The report was adopted, and the dividend declared. A vote of thanks to the Engineer and his staff was moved by Mr. Worthington Church, seconded by Mr. A. J. Haward, and carried by acclamation.

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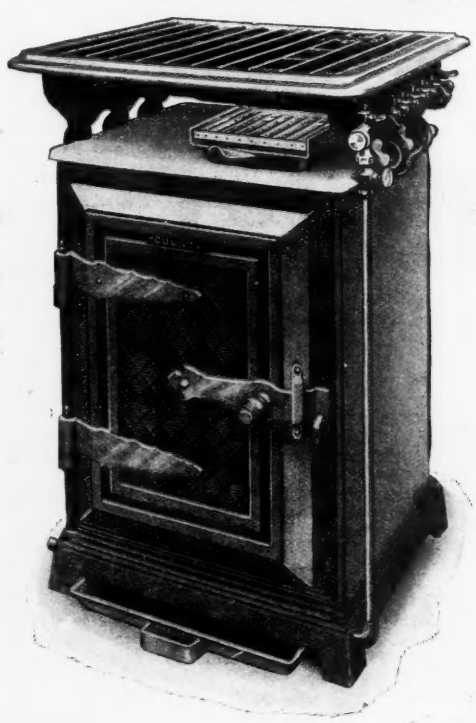

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Brighton Public Lighting Estimates.—The Estimates Sub-Committee of the Lighting Committee of the Brighton Corporation, reporting on the next year's estimates, recommend that the item for electricity supply for street lighting be reduced from £7500 to £3650, and that for gas from £1100 to £550, on the assumption that only half the normal supply of electricity and gas will be used, owing to restricted lighting. There will be a reduction of £500 in the item for trimming the lamps, owing to metallic filament lamps being substituted for the arc lamps; and the estimated total saving on public lighting is £5000.

Lighting of Sedgley.—A recommendation of the Gas Committee has been adopted by the Sedgley Urban District Council, to the effect that a loan of £3000 be obtained for improving the lighting of the parish. Mr. Brown explained that, according to the expert's report, the inadequate lighting arrangements could only be improved by putting down larger mains of 12 inches diameter from the works to Upper Gornal, 10 inches from that part of the parish through Sedgley, and 8 inches further on to the limit of the supply. The new mains were estimated to cost £2650, and the balance was required for alterations to the mains at the works and contingencies. Mr. Pearcey (who presided) said the work would take about three years to complete.

Wigan Gas and Rate-Relief.—In proposing the adoption of the minutes of the Gas Committee at the monthly meeting of the Wigan Borough Council, Alderman Angus said it would not be wise to hold out any hope of relief of rates from the gas profits at the end of the financial year. The reason was the decreased revenue from residuals. Taking the average revenue, they would have a profit of something like £5000; but this would cover only the cost of street lighting, so that there would be nothing to hand over. Wigan was only in the same position as the majority of the gas-works in the country in consequence of the war. With regard to the engagement of an expert, the Committee had decided upon Mr. Charles Carpenter, D.Sc., the Chairman of the South Metropolitan Gas Company.

Aylesbury Gas Company.—The Directors stated in their report for the half year ended Dec. 31, which was adopted at the meeting last Thursday, that, after making provision for interest charges, the balance of profit available for dividends was £1735. Out of this it was recommended that a dividend at the rate of 2 per cent. for the half year (less income-tax) be paid upon the consolidated ordinary stock. There would be a balance of £535 to be carried forward. Mr. George Lane (Manager) and Mr. A. G. Lane (Assistant-Manager) were thanked, at the instance of the Chairman (Mr. C. C. Chilton) for the able manner in which they had discharged their duties to the Company. Mr. Lane, in acknowledgment, referred to the fact that, while a number of gas companies had had to resort to the expedient of increasing the price of gas to the consumer, owing to the coal crisis, the Aylesbury Company had up to the present been in a position to supply gas at the same rate as before. This he thought was a matter on which they might be congratulated.

Draycott Gas Company.—Presiding at the annual meeting of the Draycott Gas Company, Mr. J. N. Derbyshire, in moving the adoption of the report, stated that there were several explanations of the fact that the profit had fallen from £3217 in 1913 to £2609. The sales of gas had decreased by 5 million cubic feet on the year. Coal had also cost more than for any period during the preceding twenty years; and, as a further drawback, the residual products had given disappointing results. Faced by such a decrease in profits, the Directors had decided to reduce the ordinary dividend from 5 to 4 per cent. The carry-forward had slightly increased; so that the Company were paying their way, and preparing for the current year, which he was afraid would not prove much better.

A Difficult Winter at Maidenhead.—At the half-yearly meeting of the Maidenhead Gas Company, Mr. J. W. Walker (the Chairman) said those who had had charge of the working of the Company for many years past were unanimous in their opinion that there had never been such a winter as that just experienced. The difficulties had been absolutely unprecedented. The large number of soldiers stationed in the town had greatly increased the demand; and owing to the floods and the war there had been trouble in obtaining coal which had added enormously to the anxiety of working the concern. In fact, so unprecedented had been their difficulties that they had done what he never remembered them doing before, mentioned by name in their report two officers of the Company to whom the Directors and stockholders were more especially indebted—their Engineer (Mr. A. F. Phillips) and their Works Manager (Mr. George Wood). It was encouraging to know that there was an increase of practically 8 per cent. on the gas made and sold. The report having been unanimously adopted, a dividend was declared of 6 per cent. per annum (less income-tax) for the half year to December.

The Fleet Urban District Council having recently raised a question as to whether, in the event of a raid by enemy aircraft, the gas could be turned off from the main, the following reply was received from Mr. R. W. Edwards, the General Manager of the Aldershot Gas Company: "In the unhappy event of such a step being necessary, Fleet can be speedily isolated as regards gas supplies." A local paper says: "Fleet, therefore, may claim in such matters to be quite as wide-awake and up-to-date as London."

Mr. Harold S. Aspinall, of Brooklands, Manchester, is leaving the British Westinghouse Company at the end of this month, to take up the position of London District Manager of the Keighley Gas and Oil Engine Company, with an office at No. 110, Fenchurch Street, E.C., Mr. Aspinall has been with the British Westinghouse Company for almost thirteen years, the last three-and-a-half of which he has specialized on horizontal gas and oil engines, and is consequently well known in the gas profession in the Northern District.

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APPLICATIONS FOR LETTERS PATENT.

2797.—BLACKBURN, J. P., "Gas-cooker." Feb. 22.
2806.—ROBSON, W. H., "Intermittent flash-light." Feb. 22.
2823.—SPARKS, E., "Gas-burners." Feb. 22.
2836.—HANDS, G., "Water-heaters." Feb. 22.
2946.—WISKOTT, M., "Reflectors." Feb. 23.
3064.—JACKSON, J. M., "Combination gas-fire." Feb. 25.
3069.—PATERSON, W., "Controlling discharge of liquids." Feb. 25.
3094.—VALENTINE, H. S., "Combination fire-grates." Feb. 26.
3095.—VALENTINE, H. S., "Gas-fires." Feb. 26.
3147.—SIMMONDS ENGINEERING COMPANY, "Retort discharging machines." Feb. 26.
3179.—HAWTHORNE, H. S., "Gas-fire radiants." Feb. 27.

Messrs. "Pifco" Limited, of Manchester, have been appointed to act for a series of years as sole selling agents for the Safety Wire Gas-Globe Company, of America. This wire substitute for glass was described and illustrated in the "JOURNAL" for Dec. 8 last [p. 537]; and it need only be added here that the globes, of which stocks are already held on this side, are at present limited to three patterns—the upright "C," the "Universal" inverted or "Graetzin" fitting, and the inner chimney intended to be used with glass-globes or beaded fringes.

The report to be presented at the meeting in Birmingham to morrow of John Wright and Eagle Range, Limited, states that the balance of the revenue account for the year ended Dec. 31 (after augmenting the contingent reserve), including £10,793 brought forward, is £70,716. After deducting the interim dividends there remains at disposal £52,270, which the Directors recommend be appropriated as follows: A dividend at the rate of 6 per cent. per annum for the half year on the preference shares (less income-tax), £2311; a dividend of 2s. 6d. per share on the ordinary shares (free of income-tax), £26,750; and to the reserve fund, £12,000. This will leave the carry-forward to next year £11,209.

The Higher Education Sub-Committee of the Salford Education Committee have had under consideration the representations submitted by a deputation on behalf of the organized associations of the plumbing trade, in regard to the practical class in gas-fitting, held at the Technical Institute. While cordially recognizing the great interest the associations have manifested in the improvement of the technical training and qualifications of those engaged in this trade, the Sub-Committee point out that, in organizing the classes in the several departments of the Institute, the object is to provide fundamental instruction in those branches of knowledge which have a direct bearing upon the industries and requirements of the district. Subject to the ordinary regulations for the governing of the Institute, the only qualification that should be applied to candidates for admission to the various classes is that of educational fitness. After a full review of the circumstances, and consideration of the representations submitted by the deputation, the Sub-Committee re-affirm this principle, and cannot see their way to impose the restrictions suggested.

GAS COMPANIES IN THE STOCK EXCHANGE.

It is gratifying to be able to note an improvement last week in the state of things on the Stock Exchange, as compared with the week before. There was more enterprise and more confidence; there was a bigger aggregate of recorded bargains; and prices in some markets were materially firmer. At the opening the tendency had been somewhat variable, but a brighter tone was soon struck by the published intelligence from both seats of war on land. This was again enhanced by the exploits of our maritime expedition to the Dardanelles; and the close of the week was quite cheerful. If internal difficulties arising out of anomalies in regard to "minimum prices" could be smoothed out, business on the Exchange would run more freely. Of the firmer markets, American showed a welcome recovery, and Home Rails in a slighter degree participated. The Oil Market was strong and active; and generally all undertakings engaged in the production of warlike appliances and material are naturally doing well. Business in gas securities was rather more active, and prices were steady. In connection with the bargains noted below, it must be observed that Liverpool "A" and "B" are now consolidated into one 5 per cent. stock, and also that the bargains in the San Paulo debentures of £50 each have apparently been recorded at a price per cent. and not per bond.

Bargains done for cash during the week were as follows: On Monday, Brentford new 98½, 99, Commercial 4 per cent. 98½, 99, Gas Light ordinary 91¼, 91⅜, 91½, 91⅞, ditto preference 91, 91½, ditto debenture 70½. On Tuesday, Buenos Ayres 80, Commercial debenture 69½, Gas Light ordinary 91¼, 91⅜, 91½, 91⅝, 91¾, 91⅞, 92, ditto maximum 70½, ditto preference 91¼, 91½, Imperial Continental 83¼, Monte Video 10⅜, 10½, Primitiva 4⅝, ditto preference 4 9/16. On Wednesday, British 42, Gas Light ordinary 91¼, ditto maximum 71¼, ditto preference 91¼, 91½, ditto debenture 71½, Primitiva preference 4½, South Metropolitan 97½, 98, South Suburban 108, Wandsworth "B" 119⅜. On Thursday, British 40, Commercial debenture 69, Gas Light ordinary 90¼, 91, ditto preference 91¼, 91¾ Imperial Continental 83¼, 83¾, Primitiva preference 4½, 4 9/16, River Plate 81½, 82, South Metropolitan debenture 63, South Suburban 109, Tottenham "B" 112½, 113, 113½, Newcastle 92⅜. On Friday, Brentford new 98, Gas Light ordinary 90¾, 91½, 91¾, Imperial Continental 81¼, 81⅜, Primitiva preference 4⅜, 4 9/16, San Paulo preference 9 1/16, 9⅛, ditto debenture 90¼, 90½, Liverpool 101. On Saturday, Continental Union 70¼, 70½, European 12½, Gas Light maximum 71½, ditto preference 91¼, 91½, 91¾, Primitiva preference 4½, 4 17/32, South Metropolitan 97, 97½, 98, ditto debenture 70.

Bank rate (fixed Aug. 8) 5 per cent.; last year, 3 per cent.

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WANTED, FOR SALE, CONTRACTS, &c., ADVERTISEMENTS IN THIS WEEK'S "JOURNAL."

Appointments, &c., Vacant.

ENGINEER AND MANAGER. Mossley Gas Committee. Applications by March 8.

GAS-WORKS MANAGER. Neath Corporation. Applications by March 16.

SECRETARY AND ACCOUNTANT. Sittingbourne Gas Company. Applications by March 20

DRAUGHTSMAN. West's Gas Improvement Company, Manchester.

GAS-FITTER. Shotley Bridge and Consett Gas Company.

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Sales of Stocks and Shares.

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SOUTHGATE GAS COMPANY. London Mart. March 23.

TENDRING HUNDRED WATER COMPANY. London Mart. March 23.

TENDERS FOR

Gasholder and Tank.

NEW MILLS URBAN DISTRICT COUNCIL. Tenders by March 16.

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ROCHDALE GAS DEPARTMENT. Tenders by March 17.

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DARLINGTON GAS DEPARTMENT. Tenders by March 18.

Tar and Liquor.

COLNE GAS DEPARTMENT. Tenders by March 20.

HAWORTH URBAN DISTRICT COUNCIL. Tenders by March 22.

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COPY FOR ADVERTISEMENTS for the "JOURNAL" should be received at the Office NOT LATER than TWELVE O'CLOCK NOON ON MONDAY, to ensure insertion in the following day's issue.

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